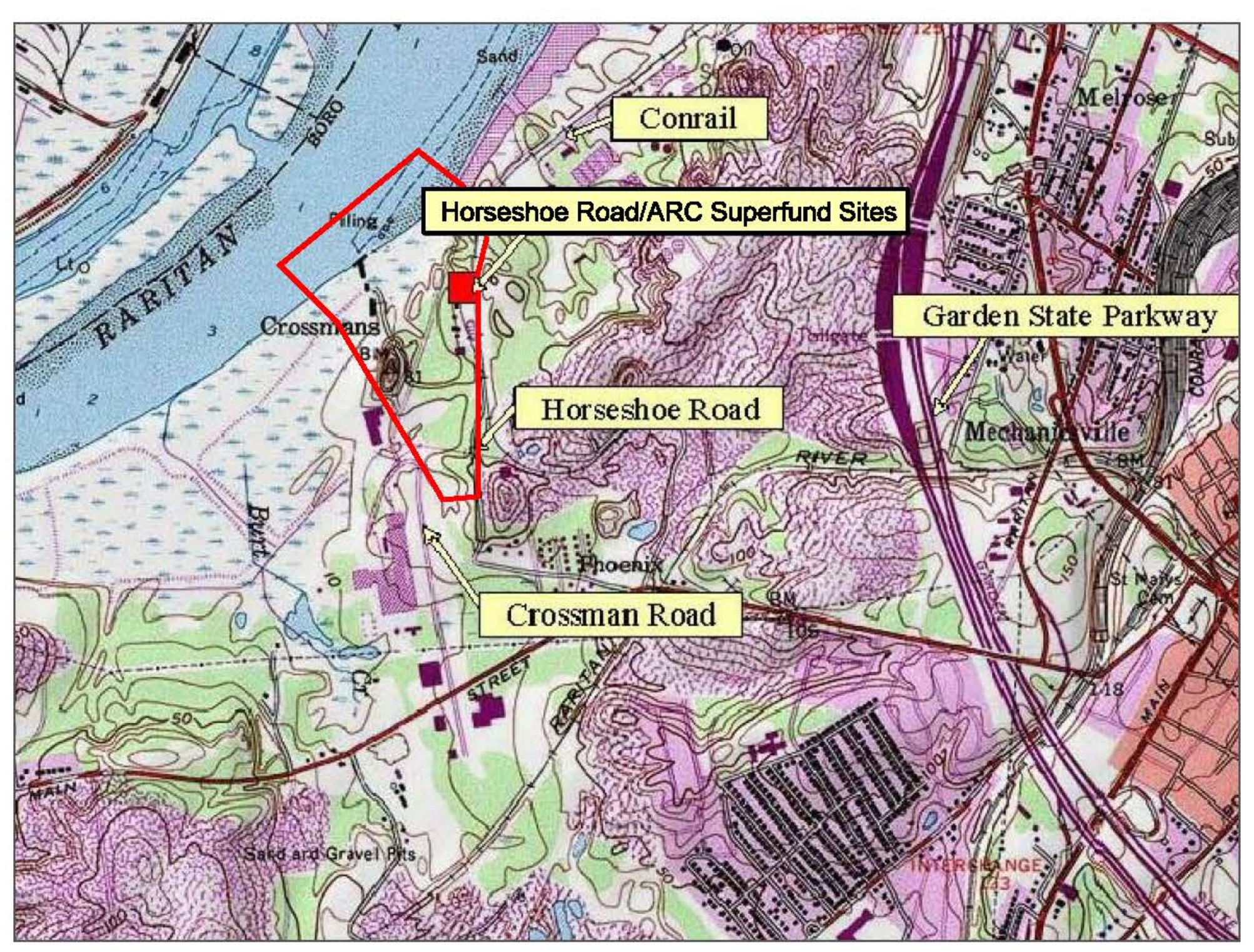
US Army Corps of Engineers
Kansas City District

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

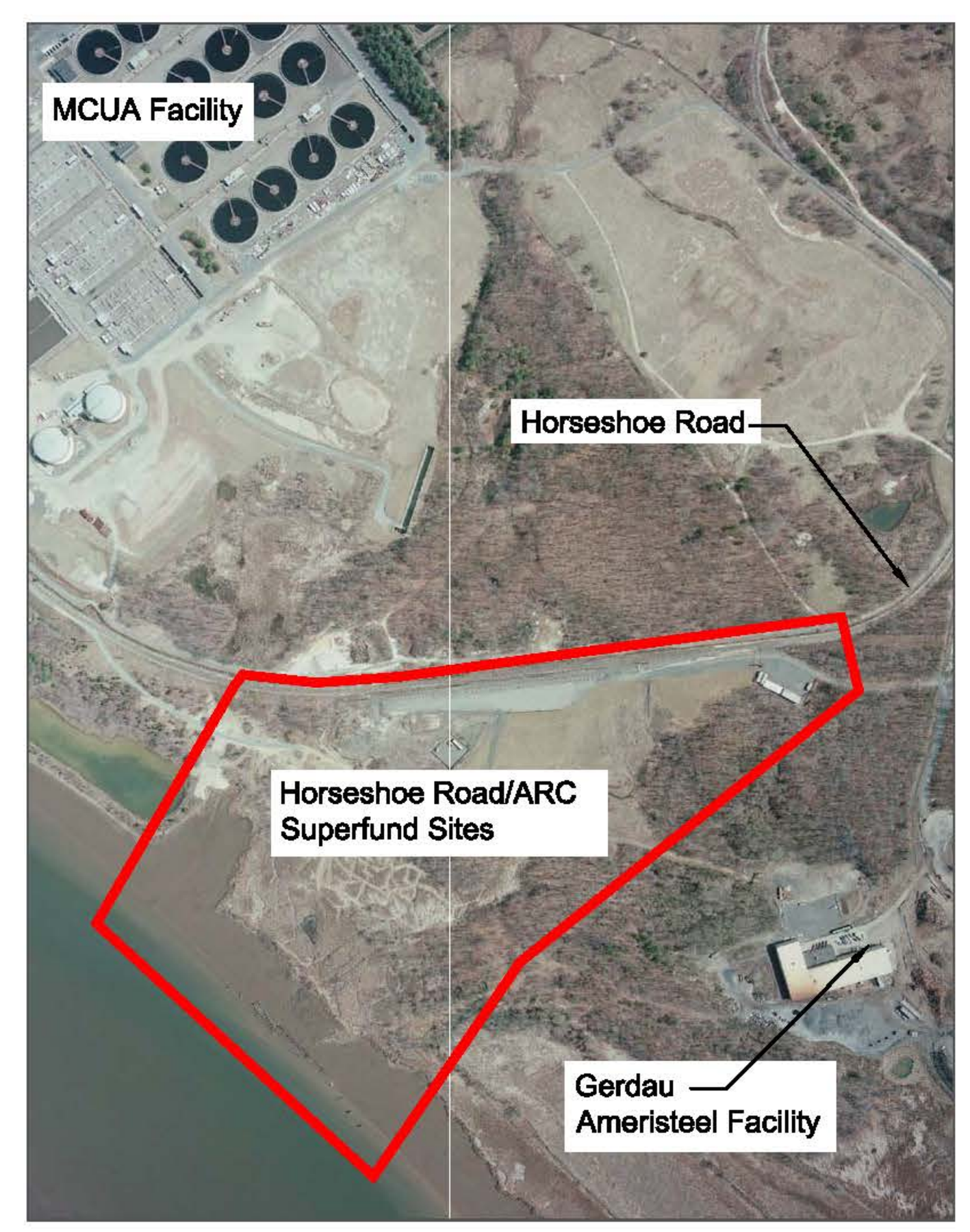
100% REMEDIAL DESIGN
AUGUST 2014

NEW JERSEY

LOCATION MAP
NTS



VICINITY MAP
NTS



AERIAL VIEW
NTS

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291695

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

Designed by: E. GALLERIE
Dwn by: E. LARSON
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 7/31/2014
Plot by: Gallerie, Ellen
Scale: 1:1
File name: GCS00000.dwg

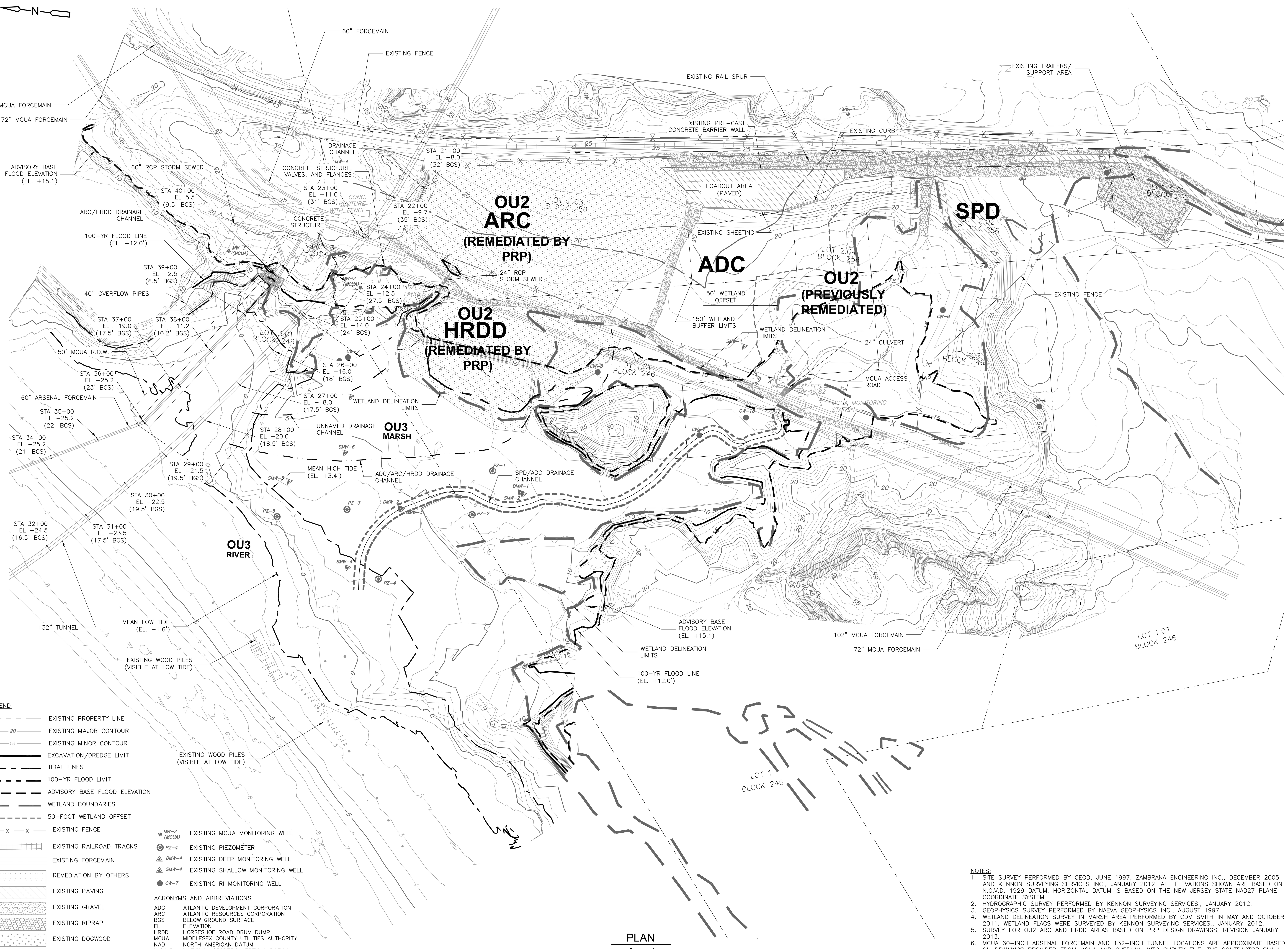
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

COVER SHEET

SHEET NO.

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\01 GENERAL\10 CADD\GCS00000.DWG



LEGEND

EXISTING PROPERTY LINE	
20	EXISTING MAJOR CONTOUR
18	EXISTING MINOR CONTOUR
EXCAVATION/DREDGE LIMIT	
TIDAL LINES	
100-YR FLOOD LIMIT	
ADVISORY BASE FLOOD ELEVATION	
WETLAND BOUNDARIES	
50-FOOT WETLAND OFFSET	
EXISTING FENCE	
EXISTING RAILROAD TRACKS	
EXISTING FORCEMAIN	
REMEDIATION BY OTHERS	
EXISTING PAVING	
EXISTING GRAVEL	
EXISTING RIPRAP	
EXISTING DOGWOOD	
150-FOOT WETLAND BUFFER	
EXISTING PRECAST CONCRETE BARRIER OR SHEETING	
EXISTING CURB	
EXISTING DRAINAGE CHANNEL	

MW-2 (MCUA)	EXISTING MCUA MONITORING WELL
PZ-4	EXISTING PIEZOMETER
DMW-4	EXISTING DEEP MONITORING WELL
SMW-4	EXISTING SHALLOW MONITORING WELL
CW-7	EXISTING RI MONITORING WELL

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
ARC	ATLANTIC RESOURCES CORPORATION
BGS	BELOW GROUND SURFACE
EL	ELEVATION
HRDD	HORSESHOE ROAD DRUM DUMP
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
NAD	NORTH AMERICAN DATUM
N.G.V.D	NATIONAL GEODETIC VERTICAL DATUM
OU	OPERABLE UNIT
PRP	POTENTIAL RESPONSIBLE PARTY
RCP	REINFORCED CONCRETE PIPE
RI	REMEDIAL INVESTIGATION
R.O.W.	RIGHT-OF-WAY
SPD	SAYREVILLE PESTICIDE DUMP
STA	STATION
YR	YEAR

PLAN

1" = 80'

40 0 80

NOTES:

1. SITE SURVEY PERFORMED BY GEOD, JUNE 1997, ZAMBRANA ENGINEERING INC., DECEMBER 2005 AND KENNON SURVEYING SERVICES INC., JANUARY 2012. ALL ELEVATIONS SHOWN ARE BASED ON N.G.V.D. 1929 DATUM. HORIZONTAL DATUM IS BASED ON THE NEW JERSEY STATE NAD27 PLANE COORDINATE SYSTEM.
2. HYDROGRAPHIC SURVEY PERFORMED BY KENNON SURVEYING SERVICES., JANUARY 2012.
3. GEOPHYSICS SURVEY PERFORMED BY NAEVA GEOPHYSICS INC., AUGUST 1997.
4. WETLAND DELINEATION SURVEY IN MARSH AREA PERFORMED BY CDM SMITH IN MAY AND OCTOBER 2011. WETLAND FLAGS WERE SURVEYED BY KENNON SURVEYING SERVICES., JANUARY 2012.
5. SURVEY FOR OU2 ARC AND HRDD AREAS BASED ON PRP DESIGN DRAWINGS, REVISION JANUARY 2013.
6. MCUA 60-INCH ARSENAL FORCEMAIN AND 132-INCH TUNNEL LOCATIONS ARE APPROXIMATE BASED ON DRAWINGS PROVIDED FROM MCUA AND OVERLAIN INTO SURVEY FILE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD LOCATING THESE FORCEMAINS.
7. ADVISORY BASE FLOOD ELEVATION FROM FEMA, ADVISORY BASE FLOOD ELEVATION MAPPING, MAP ID: SOUTH AMBOY NW, DATED DECEMBER 7, 2012.
8. SITE SURVEY FILES AND SURVEY CONTROL POINT INFORMATION WILL BE MADE AVAILABLE TO THE CONTRACTOR AFTER AWARD OF CONTRACT.

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER NO. 24GE04395200

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Designed by: E. GALLERIE		Date: AUGUST 2014 / ANSIF
Dwn by: E. LARSON	Ckd by: M. POPPER	Task Order: 010
Reviewed by: T. MATHEW		Contract no.: W912DQ-11-D-3004
Submitted by: K. TAN		Plot date: 8/2/2014 Plot by: Gallerie, Ellen Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL001.dwg

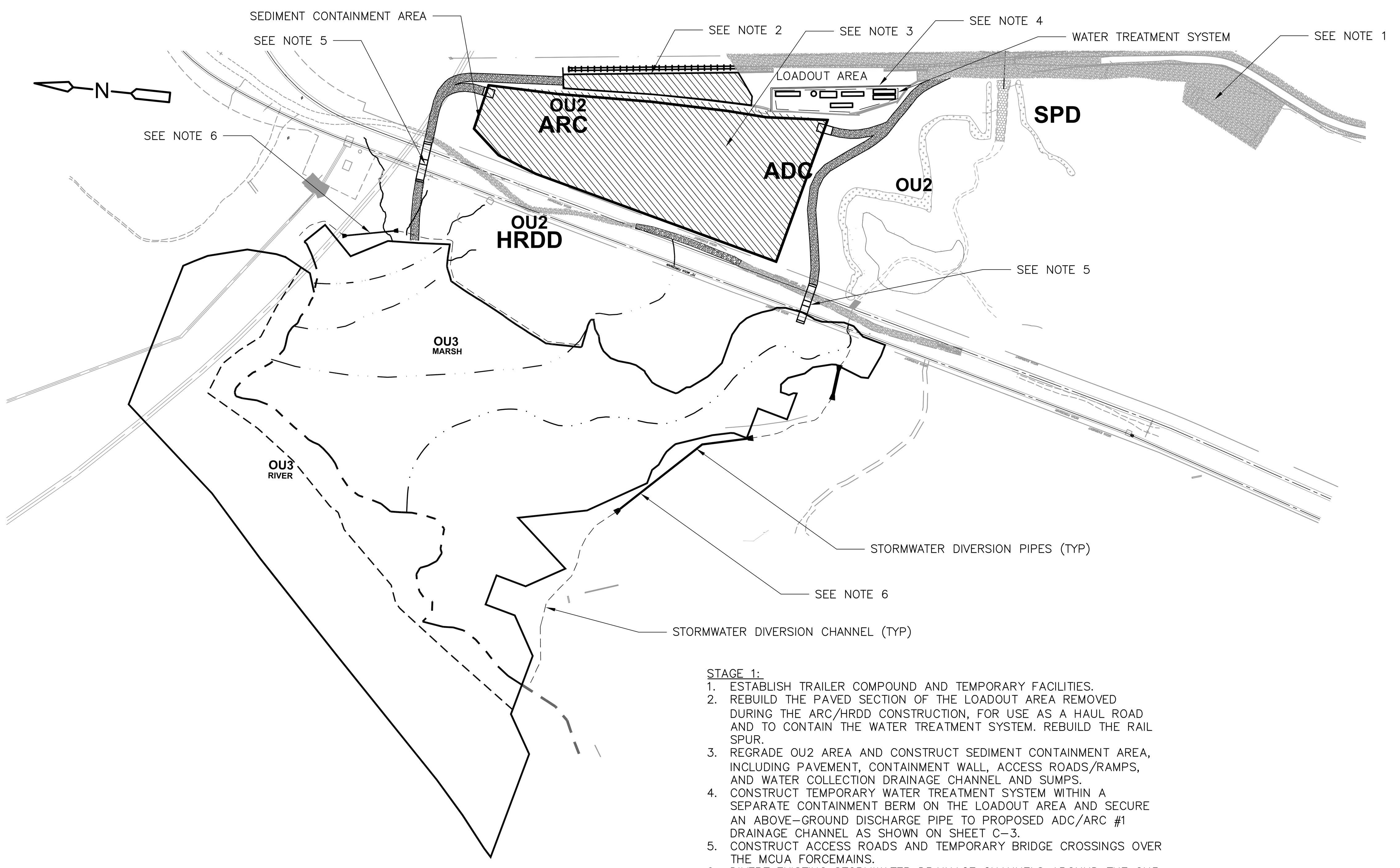
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

EXISTING SITE CONDITIONS

SHEET NO.

C-1

100% DESIGN



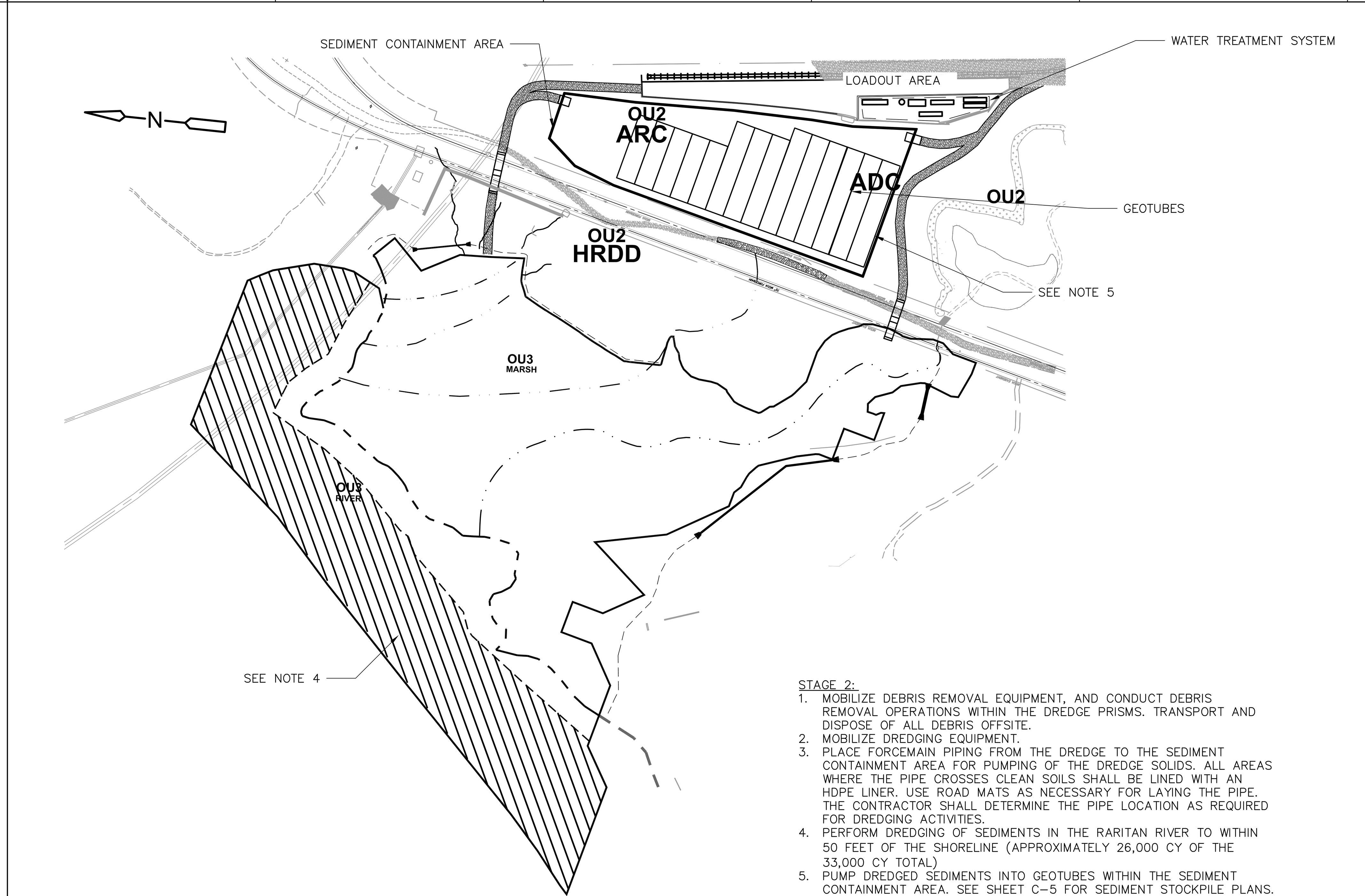
STAGE 1 – SITE PREPARATION

PLAN

1" = 150'

75 0 150

STAGE 1:
1. ESTABLISH TRAILER COMPOUND AND TEMPORARY FACILITIES.
2. REBUILD THE PAVED SECTION OF THE LOADOUT AREA REMOVED DURING THE ARC/HRDD CONSTRUCTION, FOR USE AS A HAUL ROAD AND TO CONTAIN THE WATER TREATMENT SYSTEM. REBUILD THE RAIL SPUR.
3. REGRADE OU2 AREA AND CONSTRUCT SEDIMENT CONTAINMENT AREA, INCLUDING PAVEMENT, CONTAINMENT WALL, ACCESS ROADS/RAMPS, AND WATER COLLECTION DRAINAGE CHANNEL AND SUMPS.
4. CONSTRUCT TEMPORARY WATER TREATMENT SYSTEM WITHIN A SEPARATE CONTAINMENT BERM ON THE LOADOUT AREA AND SECURE AN ABOVE–GROUND DISCHARGE PIPE TO PROPOSED ADC/ARC #1 DRAINAGE CHANNEL AS SHOWN ON SHEET C–3.
5. CONSTRUCT ACCESS ROADS AND TEMPORARY BRIDGE CROSSINGS OVER THE MCUA FORCEMAINS.
6. DIVERT EXISTING STORMWATER DRAINAGE CHANNELS AROUND THE OU3 MARSH EXCAVATION AREA USING DIVERSION CHANNELS AND DISCHARGE PIPES TO THE RARITAN RIVER.
7. PERFORM THE CAPPING PILOT TEST IN ACCORDANCE WITH SECTION 02201 – EARTHWORK.



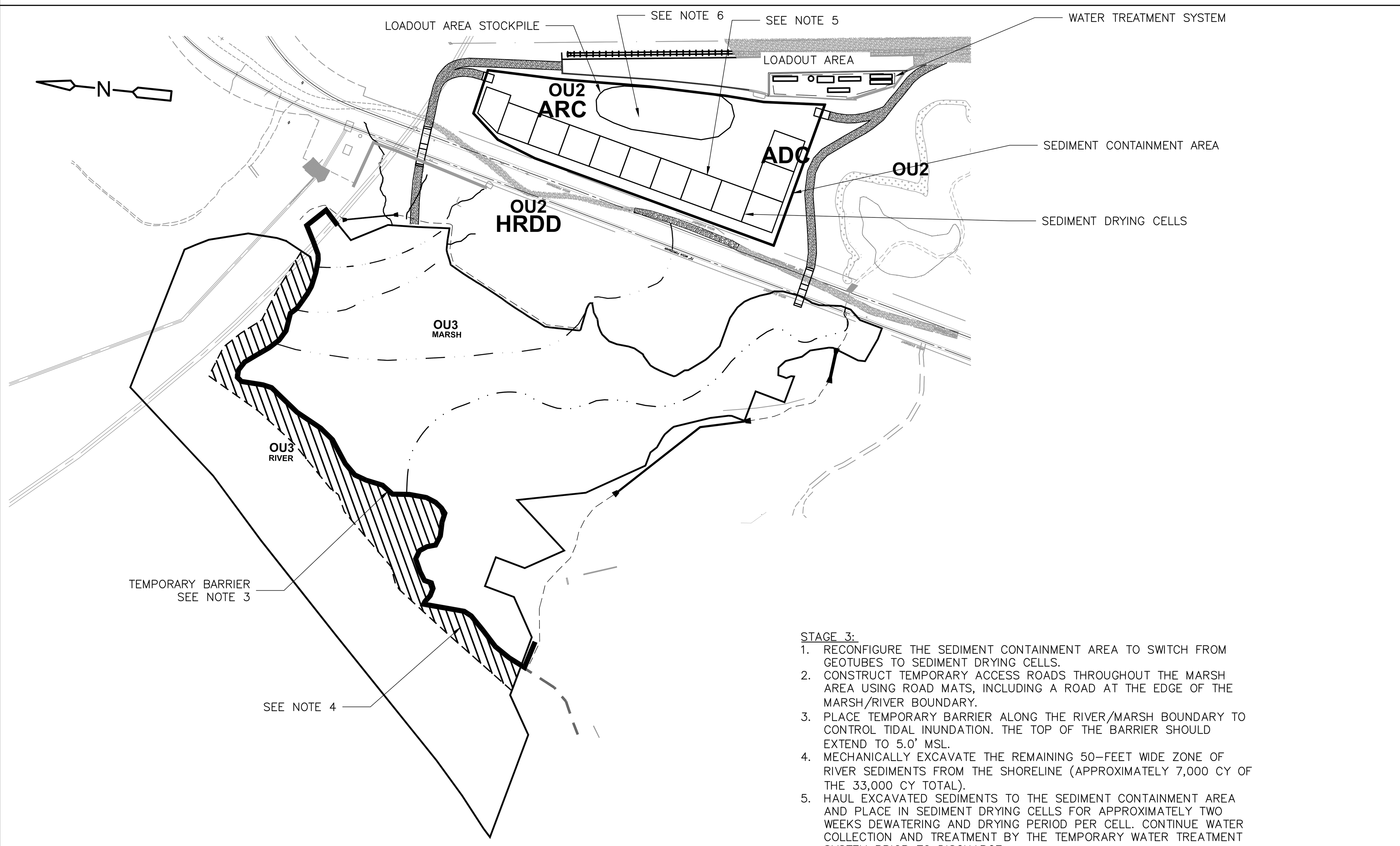
STAGE 2 – OU3 RIVER HYDRAULIC DREDGING

PLAN

1" = 150'

75 0 150

STAGE 2:
1. MOBILIZE DEBRIS REMOVAL EQUIPMENT, AND CONDUCT DEBRIS REMOVAL OPERATIONS WITHIN THE DREDGE PRISMS. TRANSPORT AND DISPOSE OF ALL DEBRIS OFFSITE.
2. MOBILIZE DREDGING EQUIPMENT.
3. PLACE FORCEMAIN PIPING FROM THE DREDGE TO THE SEDIMENT CONTAINMENT AREA FOR PUMPING OF THE DREDGE SOLIDS. ALL AREAS WHERE THE PIPE CROSSES CLEAN SOILS SHALL BE LINED WITH AN HDPE LINER. USE ROAD MATS AS NECESSARY FOR LAYING THE PIPE. THE CONTRACTOR SHALL DETERMINE THE PIPE LOCATION AS REQUIRED FOR DREDGING ACTIVITIES.
4. PERFORM DREDGING OF SEDIMENTS IN THE RARITAN RIVER TO WITHIN 50 FEET OF THE SHORELINE (APPROXIMATELY 26,000 CY OF THE 33,000 CY TOTAL)
5. PUMP DREDGED SEDIMENTS INTO GEOTUBES WITHIN THE SEDIMENT CONTAINMENT AREA. SEE SHEET C–5 FOR SEDIMENT STOCKPILE PLANS.
6. COLLECT THE SEPARATED WATER WITHIN COLLECTION SUMP IN THE SEDIMENT CONTAINMENT AREA AND PROCESS THE WATER THROUGH THE WATER TREATMENT SYSTEM PRIOR TO DISCHARGE.
7. CONSTRUCT A SAND CAP AT ALL DREDGED AREAS IF DETERMINED FEASIBLE DURING THE CAPPING PILOT TEST.
8. DEMOBILIZE DREDGING EQUIPMENT. ALLOW SEDIMENTS TO DEWATER AND SOLIDIFY IN THE GEOTUBES (APPROXIMATELY 45 DAYS).
9. LOAD THE DRIED SEDIMENTS FROM THE SEDIMENT CONTAINMENT AREA ONTO THE LOADOUT AREA AND INTO RAIL CARS FOR OFFSITE T&D.



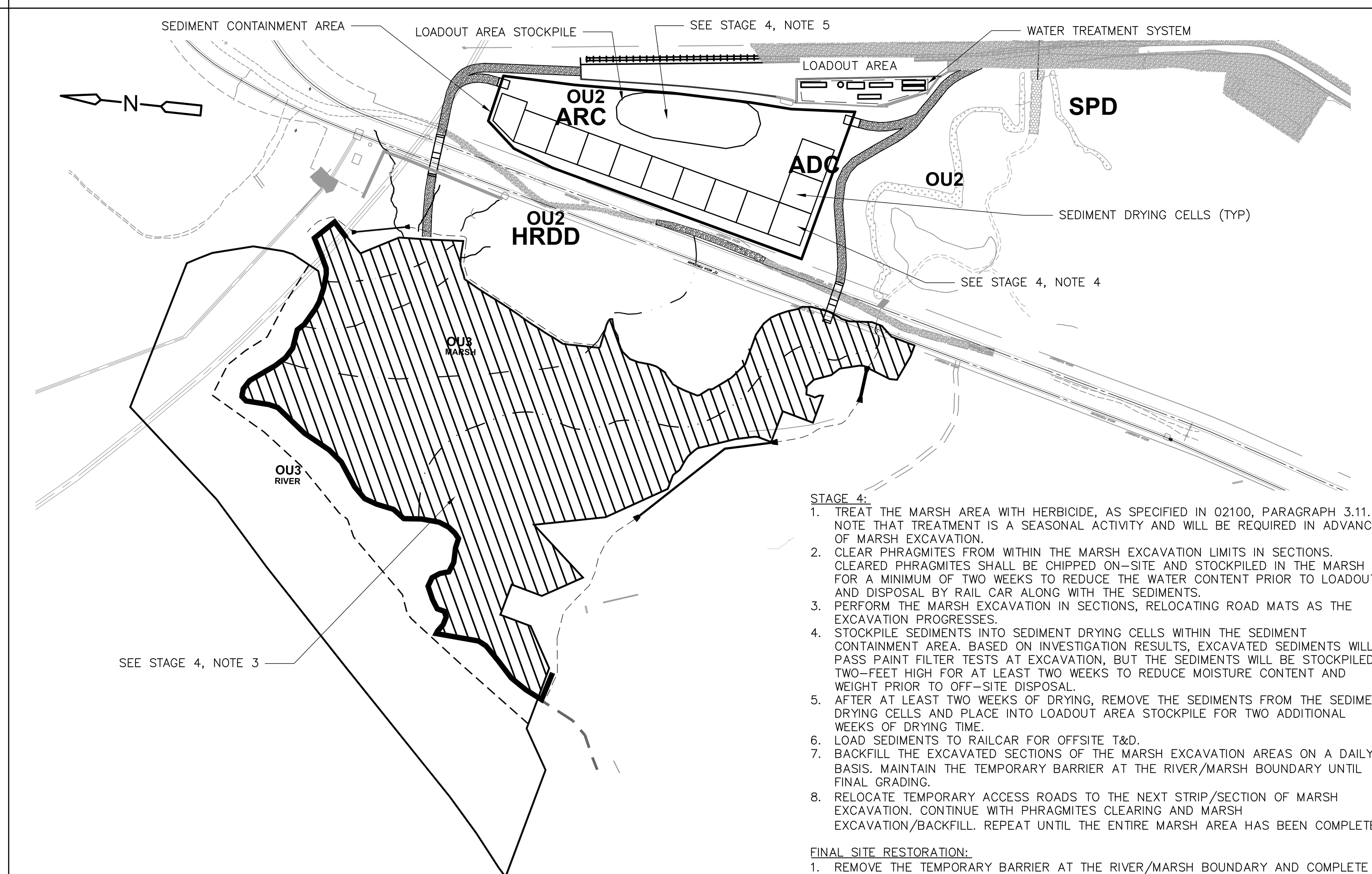
STAGE 3 – OU3 RIVER MECHANICAL EXCAVATION

PLAN

1" = 150'

75 0 150

STAGE 3:
1. RECONFIGURE THE SEDIMENT CONTAINMENT AREA TO SWITCH FROM GEOTUBES TO SEDIMENT DRYING CELLS.
2. CONSTRUCT TEMPORARY ACCESS ROADS THROUGHOUT THE MARSH AREA USING ROAD MATS, INCLUDING A ROAD AT THE EDGE OF THE MARSH/RIVER BOUNDARY.
3. PLACE TEMPORARY BARRIER ALONG THE RIVER/MARSH BOUNDARY TO CONTROL TIDAL INUNDATION. THE TOP OF THE BARRIER SHOULD EXTEND TO 5.0' MSL.
4. MECHANICALLY EXCAVATE THE REMAINING 50–FEET WIDE ZONE OF RIVER SEDIMENTS FROM THE SHORELINE (APPROXIMATELY 7,000 CY OF THE 33,000 CY TOTAL).
5. HAUL EXCAVATED SEDIMENTS TO THE SEDIMENT CONTAINMENT AREA AND PLACE IN SEDIMENT DRYING CELLS FOR APPROXIMATELY TWO WEEKS DEWATERING AND DRYING PERIOD PER CELL. CONTINUE WATER COLLECTION AND TREATMENT BY THE TEMPORARY WATER TREATMENT SYSTEM PRIOR TO DISCHARGE.
6. TRANSFER THE SEDIMENTS TO THE LOADOUT AREA STOCKPILE FOR TWO ADDITIONAL WEEKS OF DRYING TIME.
7. LOAD THE DRIED SEDIMENTS FROM THE SEDIMENT CONTAINMENT AREA ONTO THE LOADOUT AREA AND INTO RAIL CARS FOR OFFSITE T&D.
8. BACKFILL THE COMPLETED OU3 RIVER EXCAVATION/DREDGED AREA ON A DAILY BASIS.



STAGE 4 – OU3 MARSH EXCAVATION

PLAN

1" = 150'

75 0 150

STAGE 4:
1. TREAT THE MARSH AREA WITH HERBICIDE, AS SPECIFIED IN 02100, PARAGRAPH 3.11. NOTE THAT TREATMENT IS A SEASONAL ACTIVITY AND WILL BE REQUIRED IN ADVANCE OF MARSH EXCAVATION.
2. CLEAR PHRAGMITES FROM WITHIN THE MARSH EXCAVATION LIMITS IN SECTIONS. CLEARED PHRAGMITES SHALL BE CHIPPED ON–SITE AND STOCKPILED IN THE MARSH FOR A MINIMUM OF TWO WEEKS TO REDUCE THE WATER CONTENT PRIOR TO LOADOUT AND DISPOSAL BY RAIL CAR ALONG WITH THE SEDIMENTS.
3. PERFORM THE MARSH EXCAVATION IN SECTIONS, RELOCATING ROAD MATS AS THE EXCAVATION PROGRESSES.
4. STOCKPILE SEDIMENTS INTO SEDIMENT DRYING CELLS WITHIN THE SEDIMENT CONTAINMENT AREA. BASED ON INVESTIGATION RESULTS, EXCAVATED SEDIMENTS WILL PASS PAINT FILTER TESTS AT EXCAVATION, BUT THE SEDIMENTS WILL BE STOCKPILED TWO–FEET HIGH FOR AT LEAST TWO WEEKS TO REDUCE MOISTURE CONTENT AND WEIGHT PRIOR TO OFF–SITE DISPOSAL.
5. AFTER AT LEAST TWO WEEKS OF DRYING, REMOVE THE SEDIMENTS FROM THE SEDIMENT DRYING CELLS AND PLACE INTO LOADOUT AREA STOCKPILE FOR TWO ADDITIONAL WEEKS OF DRYING TIME.
6. LOAD SEDIMENTS TO RAILCAR FOR OFFSITE T&D.
7. BACKFILL THE EXCAVATED SECTIONS OF THE MARSH EXCAVATION AREAS ON A DAILY BASIS. MAINTAIN THE TEMPORARY BARRIER AT THE RIVER/MARSH BOUNDARY UNTIL FINAL GRADING.
8. RELOCATE TEMPORARY ACCESS ROADS TO THE NEXT STRIP/SECTION OF MARSH EXCAVATION. CONTINUE WITH PHRAGMITES CLEARING AND MARSH EXCAVATION/BACKFILL. REPEAT UNTIL THE ENTIRE MARSH AREA HAS BEEN COMPLETED.

FINAL SITE RESTORATION:
1. REMOVE THE TEMPORARY BARRIER AT THE RIVER/MARSH BOUNDARY AND COMPLETE BACKFILL AND FINAL GRADING OF THE MARSH ACCORDING TO THE RESTORATION GRADES. INSTALL PLANTINGS THROUGHOUT THE MARSH AS SHOWN ON THE RESTORATION PLAN.
2. RECONSTRUCT DRAINAGE CHANNELS THROUGHOUT THE MARSH AREA AND REMOVE THE TEMPORARY DIVERSION PIPING AND STRUCTURES.
3. REMOVE THE MCUA PIPE CROSSING BRIDGE AND FOUNDATIONS.
4. DEMOBILIZE THE WATER TREATMENT SYSTEM.
5. REMOVE THE SEDIMENT CONTAINMENT AREA, INCLUDING PAVEMENT AND CONTAINMENT WALL. PAVEMENT AND CONCRETE SHALL BE DISPOSED OF OFF–SITE AT APPROVED RECYCLING FACILITY.
6. REMOVE AND DISPOSE OF THE EXCAVATION SHEETING FROM THE LOADOUT AREA. DEMOLISH AND REMOVE THE ASPHALT PAVING, CURBS, GRAVEL, AND RAIL SPUR FROM THE LOADOUT AREA.
7. RE–GRADE OU2 AREA AS SHOWN ON RESTORATION PLAN.
8. DEMOBILIZE TRAILER COMPOUND. INSTALL PLANTINGS IN TRAILER COMPOUND AREA.

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

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Dwn by: E. LARSON
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
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Contract no.: W912DQ-11-D-3004
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL002.dwg

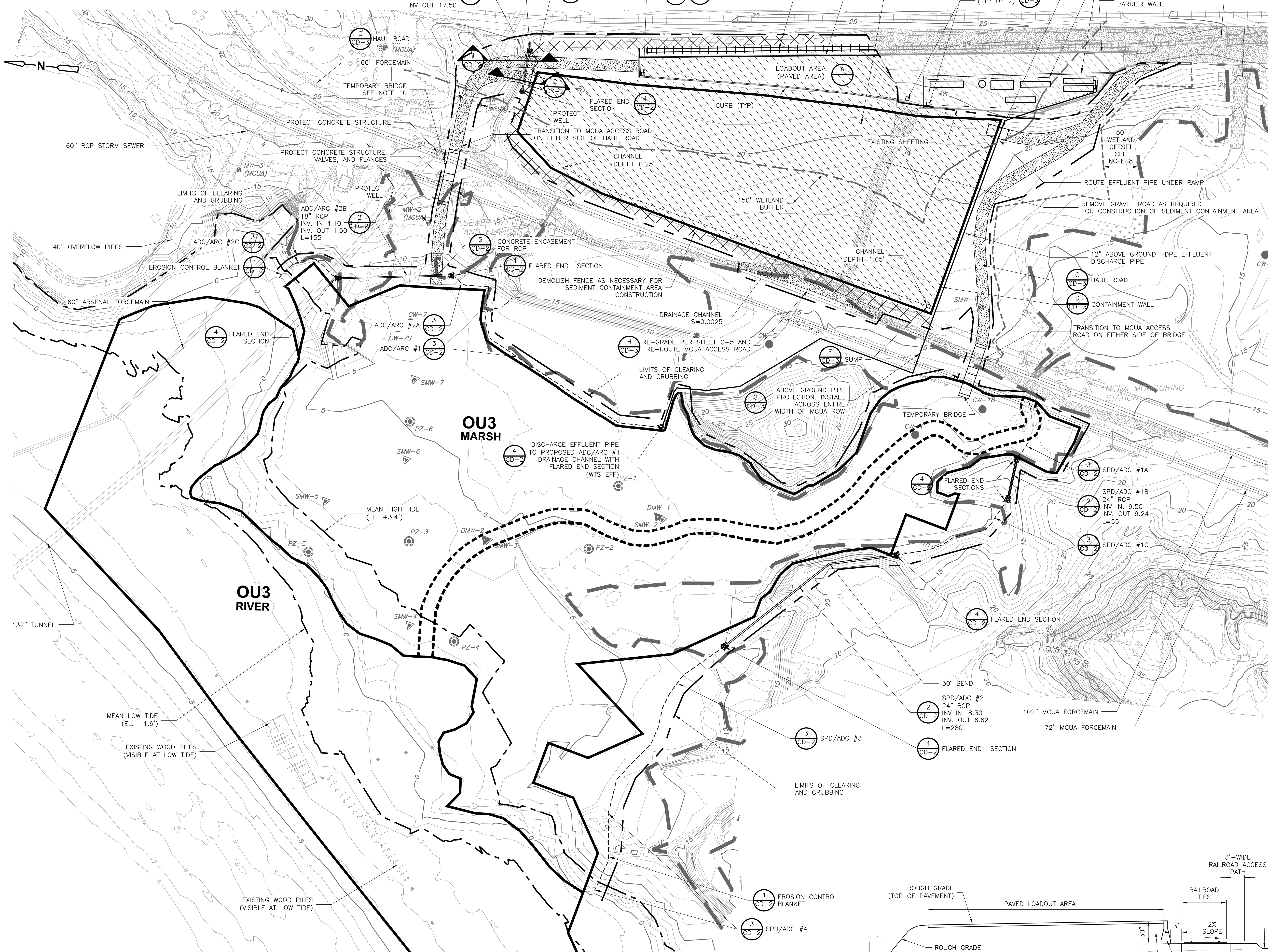
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

RECOMMENDED CONSTRUCTION SEQUENCE

SHEET NO.

C-2

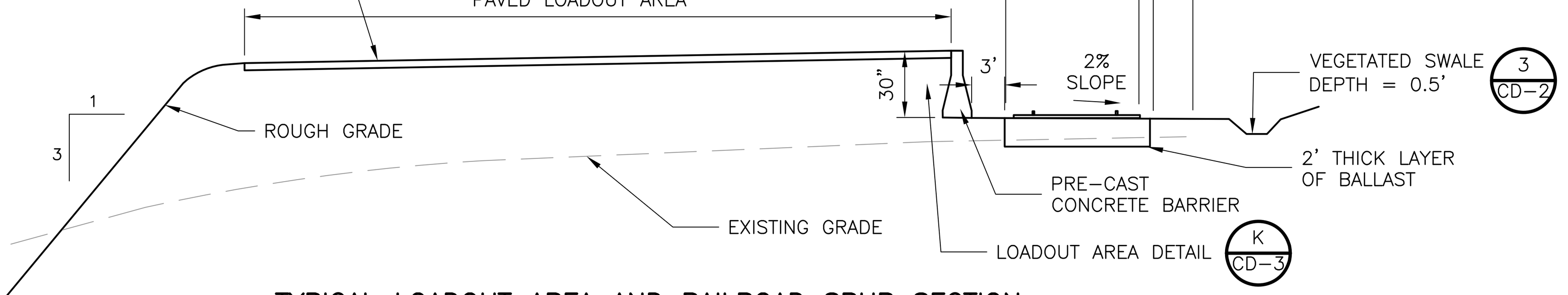
100% DESIGN



PLAN

1" = 60'

30 0 60



TYPICAL LOADOUT AREA AND RAILROAD SPUR SECTION

DETAIL A

NTS

NOTES:

1. PROPERTY ACCESS AGREEMENTS FROM THE PROPERTY OWNERS WILL BE OBTAINED BY THE GOVERNMENT FOR THE WORK SHOWN ON THE CONTRACT DRAWINGS.

2. THE CONTRACTOR SHALL FURNISH AND MAINTAIN ALL EROSION, SEDIMENT AND STORMWATER CONTROL, AS NECESSARY FOR THE DURATION OF THE PROJECT.

3. THE LOCATION OF UNDERGROUND UTILITIES SHOWN IS APPROXIMATE. THERE MAY BE UNDERGROUND UTILITIES WHICH EXIST AND ARE UNKNOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITIES TO FIELD VERIFY THE LOCATION OF UTILITIES.

4. ACCESS THROUGH GERDAU AMERISTEEL SHALL BE COORDINATED WITH MR. MARK QUIRING AT (732) 721-6600.

5. THE CONTRACTOR SHALL CONTROL ACCESS INTO THE SITE AT ALL TIMES DURING REMEDIATION, AND SHALL BE RESPONSIBLE FOR THE HEALTH AND SAFETY OF ALL PERSONS IN THE AREA.

6. SEE SHEET C-5 FOR ADDITIONAL DETAILS AND NOTES RELATING TO CONSTRUCTION OF THE SEDIMENT CONTAINMENT AND LOADOUT AREAS.

7. MONITORING WELLS SHALL BE ABANDONED BY A NEW JERSEY-LICENSED DRILLER IN ACCORDANCE WITH NEW JERSEY WELL ABANDONMENT REQUIREMENTS. THE FOLLOWING WELLS SHALL BE ABANDONED: SMW-1, SMW-2, SMW-3, SMW-4, SMW-5, SMW-6, SMW-7, DMW-1, DMW-2 CW-4, CW-7, CW-7S, CW-18, PZ-1, PZ-2, PZ-3, PZ-4, PZ-5, AND PZ-6.

8. NO WORK SHALL BE PERFORMED WITHIN 50 FEET OF THE PREVIOUSLY RESTORED WETLAND ON THE OU2 ADC/SPD PROPERTIES.

9. THE MCUA ACCESS ROAD WITHIN THE MCUA RIGHT-OF-WAY SHALL REMAIN FUNCTIONAL AT ALL TIMES.

10. CONTRACTOR SHALL DESIGN THE TEMPORARY BRIDGE IN ACCORDANCE WITH SPECIFICATION SECTION 02105.

11. PRIOR TO DREDGING, THE CONTRACTOR SHALL PERFORM DEBRIS REMOVAL OPERATIONS WITHIN THE DREDGE PRISMS. THE DEBRIS SHALL BE TRANSPORTED AND DISPOSED OF OFFSITE.

LEGEND

- MAJOR CONTOUR (20)
- MINOR CONTOUR (18)
- 50-FOOT WETLAND OFFSET
- EXCAVATION/DREDGE LIMIT
- TIDAL LINES
- CLEARING AND GRUBBING LIMITS
- WETLAND BOUNDARIES
- DRAINAGE CHANNEL
- DRAINAGE PIPE
- FENCE (—X—X—)
- RAILROAD TRACKS
- REMEDIATION BY OTHERS
- PAVING
- GRAVEL
- FEATURE TO BE DEMOLISHED
- SUMP
- MCUA MONITORING WELL (MW-2 (MCUA))
- PIEZOMETER (PZ-4)
- DEEP MONITORING WELL (DMW-4)
- SHALLOW MONITORING WELL (SMW-4)
- RI MONITORING WELL (CW-7)
- 150-FOOT WETLAND BUFFER
- PRECAST CONCRETE BARRIER OR SHEETING
- CURB
- RIP RAP

H / CD-3 — DETAIL REFERENCE, SHEET NUMBER

B-B / C-7A — SECTION REFERENCE, SHEET NUMBER

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
ARC	ATLANTIC RESOURCES CORPORATION
EFF	EFFLUENT
EL	ELEVATION
INV.	INVERT
L	LENGTH
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
OU	OPERABLE UNIT
RCP	REINFORCED CONCRETE PIPE
RI	REMEDIAL INVESTIGATION
R.O.W.	RIGHT-OF-WAY
S	SLOPE
SPD	SAYREVILLE PESTICIDE DUMP
TYP.	TYPICAL
WTS	WATER TREATMENT SYSTEM

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KANSAS CITY, MISSOURI

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File name: CSTPL003.dwg

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BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

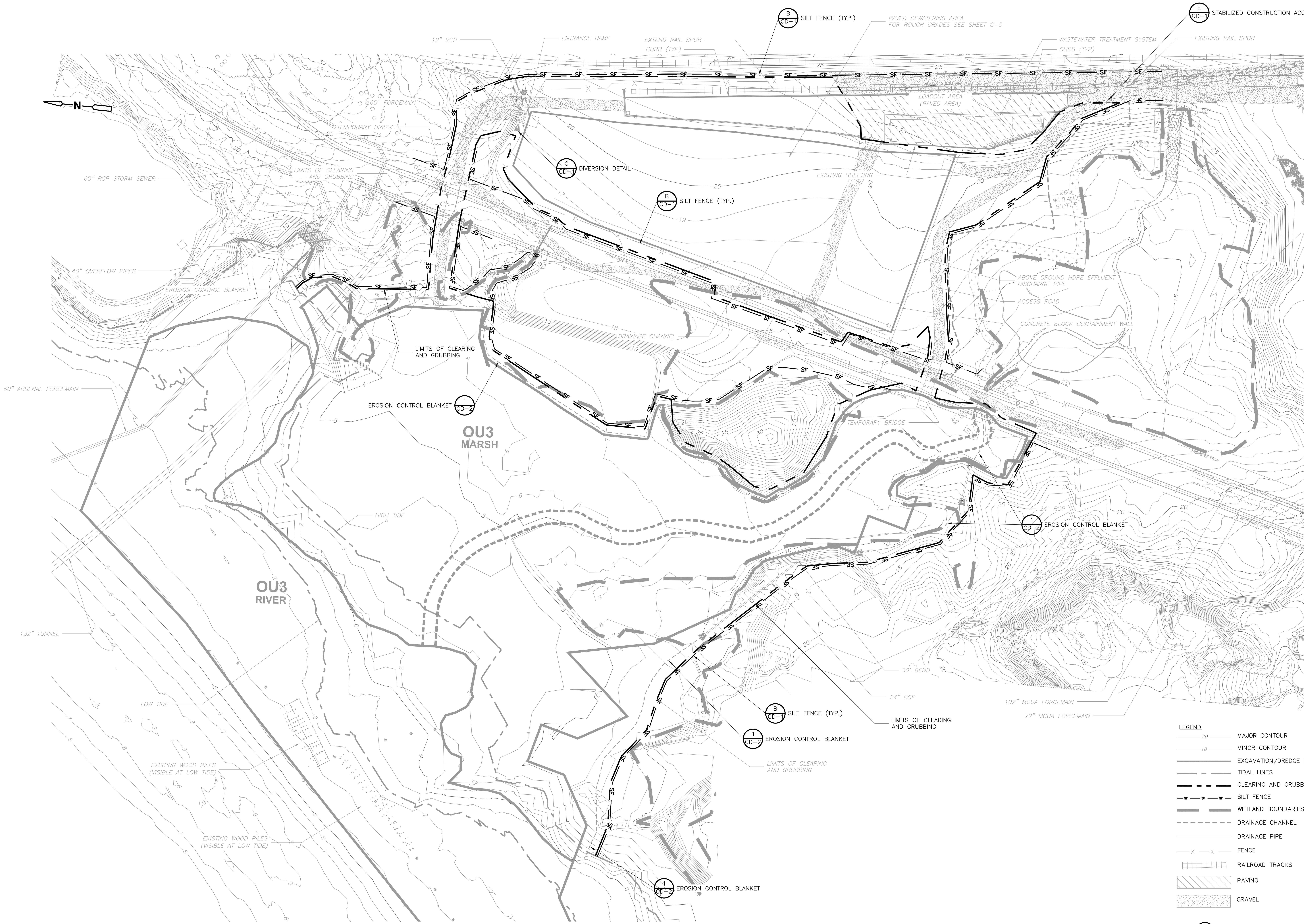
SITE PREPARATION PLAN

SHEET NO.

C-3

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\01 WORKING\CSTWP001.DWG



PLAN

1" = 60'

30 0 60

LEGEND

- MAJOR CONTOUR
- MINOR CONTOUR
- EXCAVATION/DREDGE LIMIT
- TIDAL LINES
- CLEARING AND GRUBBING LIMITS
- SILT FENCE
- WETLAND BOUNDARIES
- DRAINAGE CHANNEL
- DRAINAGE PIPE
- FENCE
- RAILROAD TRACKS
- PAVING
- GRAVEL

H / CD-3 — DETAIL REFERENCE / SHEET NUMBER

ACRONYMS AND ABBREVIATIONS

FES	FLARED END SECTION
HDPE	HIGH DENSITY POLYETHYLENE
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
RCP	REINFORCED CONCRETE PIPE
TYP.	TYPICAL

NOTE:
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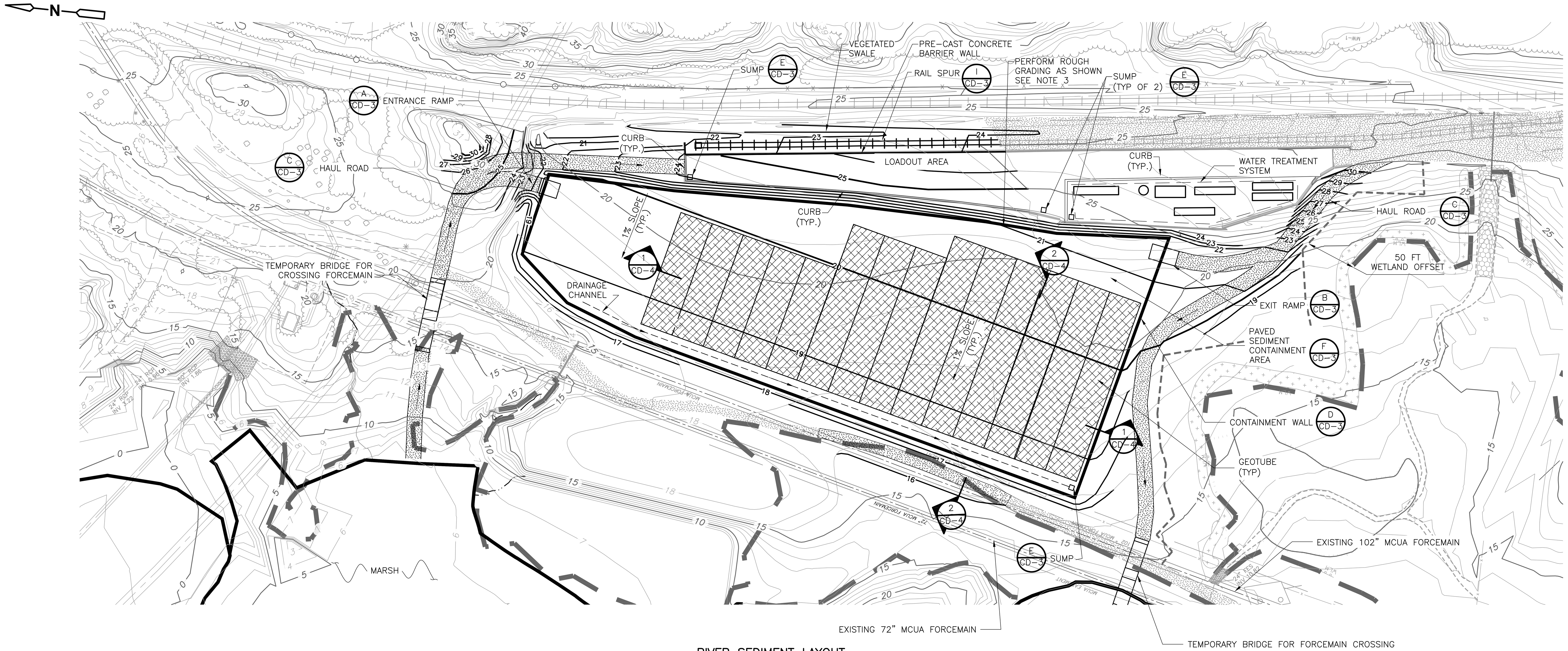
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

SOIL EROSION AND SEDIMENT CONTROL PLAN

SHEET NO.

C-4

100% DESIGN



RIVER SEDIMENT LAYOUT

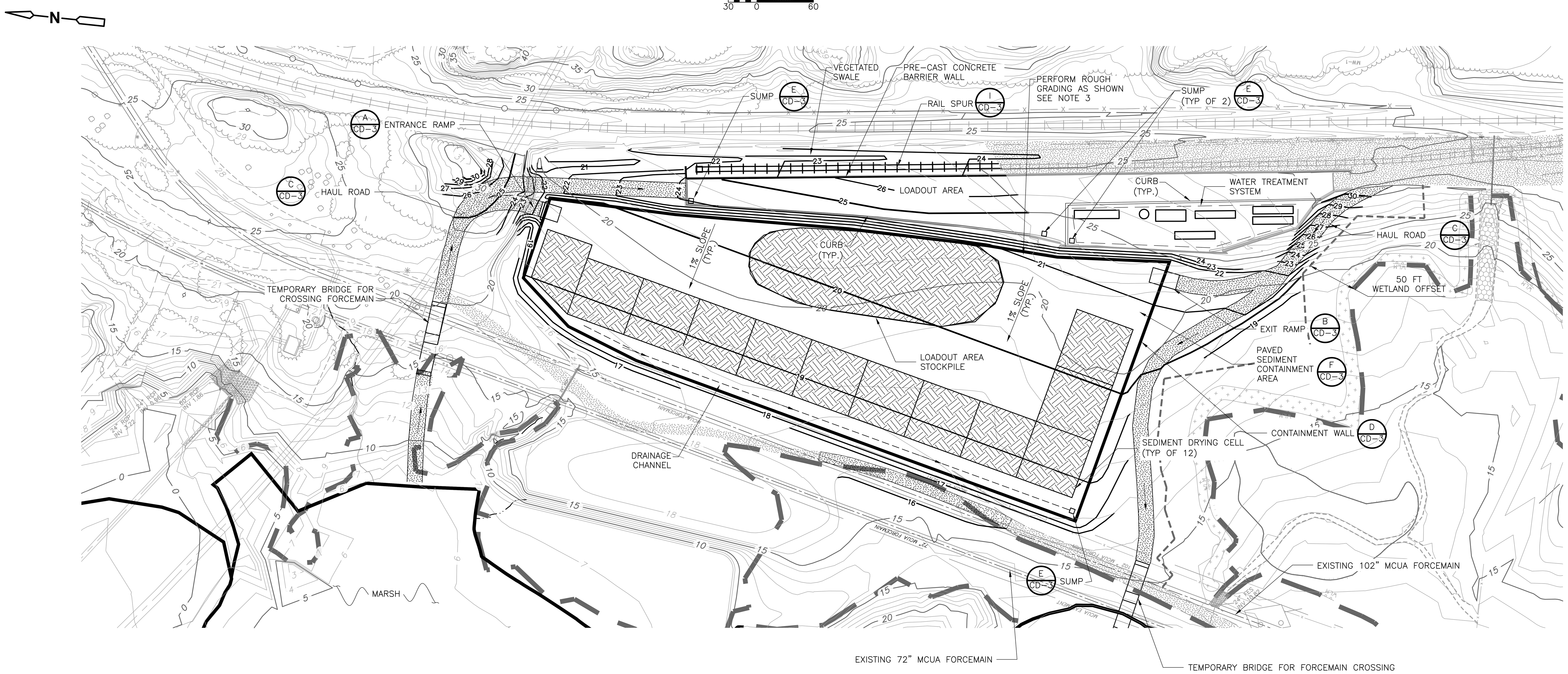
PLAN

1" = 60'

30 0 60

NOTES:

1. A PAVED SEDIMENT CONTAINMENT AREA SHALL BE CREATED OVER THE PREVIOUSLY REMEDIATED ADC/ARC AREAS, OUTSIDE OF THE WETLAND RESTORATION LIMITS. THE STOCKPILE AREA SHALL BE USED TO DRY THE EXCAVATED SEDIMENTS FROM THE OU3 RIVER AND MARSH EXCAVATIONS PRIOR TO OFFSITE DISPOSAL BY RAIL CAR.
2. THE SEDIMENT CONTAINMENT AREA SHALL CONSIST OF ASPHALT PAVEMENT WITH A PERIMETER CONTAINMENT WALL AS SHOWN ON SHEET CD-3. THE CONTRACTOR MAY SUBMIT ALTERNATIVE METHODS OF WALL CONSTRUCTION FOR APPROVAL BY THE GOVERNMENT. ENTRANCE AND EXIT RAMPS SHALL BE AS SHOWN ON THE DRAWING AND THE REFERENCED DETAIL SHEETS. WATER FROM DEWATERING WILL BE CONTAINED AND PUMPED TO THE WATER TREATMENT SYSTEM FOR TREATMENT PRIOR TO DISCHARGE.
3. PROPOSED CONTOURS SHOWN INDICATE ROUGH GRADES. PAVEMENT BASE AND SURFACE COURSES TO BE PLACED ABOVE THE ROUGH GRADES EXCEPT IN THE LOADOUT AND RAILROAD SPUR AREA WHERE CONTOURS REPRESENT TOP OF PAVEMENT AND TOP OF CONCRETE RAILROAD TIE, RESPECTIVELY. SEE SECTION ON SHEET C-3 FOR DETAILS.
4. FOR THE HYDRAULIC DREDGING PORTION OF THE OU3 RIVER EXCAVATION, IT IS ESTIMATED THAT A TOTAL OF 14 GEOTUBES WILL BE REQUIRED TO CONTAIN THE 26,000 CY OF DREDGED RIVER SEDIMENTS. PLACE FORCEMAIN FROM RIVER TO STOCKPILE AREA FOR FEEDING SEDIMENT TO THE GEOTUBES. ALL AREAS WHERE THE FORCEMAIN CROSSES CLEAN SOIL SHALL BE LINED WITH AN HDPE LINER.
5. EACH GEOTUBE IS APPROXIMATELY 35-FEET WIDE AND 6-FEET HIGH WITH VARYING LENGTHS AS SHOWN ON THE PLAN. PER VENDOR RECOMMENDATIONS. THE ESTIMATED GEOTUBE DRYING TIME IS 45 DAYS. AFTER THE GEOTUBES HAVE DRIED, SEDIMENTS SHALL BE LOADED TO RAIL CAR FOR OFF-SITE DISPOSAL. REMOVE GEOTUBE DRAINAGE LAYER.
6. FOR THE REMAINDER OF THE PROJECT, THE SEDIMENT CONTAINMENT AREA SHALL BE RECONFIGURED TO CREATE INDIVIDUAL SEDIMENT DRYING CELL AS SHOWN ON THE PLAN. EACH SEDIMENT DRYING CELL IS SIZED TO HOLD APPROXIMATELY 300 CY OF SEDIMENTS AT 2-FT DEEP, ROUGHLY EQUAL TO THE ESTIMATED DAILY PRODUCTION RATE. A TOTAL OF 12 CELLS HAVE BEEN INCLUDED ON THE SEDIMENT CONTAINMENT AREA, ALLOWING APPROXIMATELY TWO WEEKS OF DRYING PER CELL. PERFORM TILLING ON SEDIMENT DRYING CELL SEDIMENTS TO MAXIMIZE DRYING.
7. AFTER TWO WEEKS, THE SEDIMENTS SHALL BE TRANSFERRED FROM EACH SEDIMENT DRYING CELL TO THE LOADOUT AREA STOCKPILE FOR AN ADDITIONAL TWO WEEKS OF DRYING. THE STOCKPILE SHALL BE SIZED TO HOLD 12 DAYS OF WORTH OF SEDIMENT WHICH IS ESTIMATED TO BE 3,600 CY. MATERIAL SHALL SUBSEQUENTLY BE LOADED TO THE RAIL CARS.
8. AT THE COMPLETION OF THE PROJECT, THE SEDIMENT CONTAINMENT AREA, LOADOUT AREA, AND RAIL SPUR SHALL BE REMOVED. PAVING MATERIALS AND CONCRETE SHALL BE RECYCLED AT AN APPROVED FACILITY.



MARSH SEDIMENT LAYOUT

PLAN

1" = 60'

30 0 60

LEGEND

- 20 — MAJOR CONTOUR
- 18 — MINOR CONTOUR
- 50-FOOT WETLAND OFFSET
- RAILROAD TRACKS
- GRAVEL
- GEOTUBES
- SEDIMENT DRYING CELL/STOCKPILE
- SUMP
- 150-FOOT WETLAND BUFFER
- PRECAST CONCRETE BARRIER OR SHEETING
- CURB
- DRAINAGE CHANNEL
- H / CD-3 — DETAIL REFERENCE / SHEET NUMBER
- 1 / C-7A — SECTION REFERENCE / SHEET NUMBER

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

CY	CUBIC YARDS
FT	FEET
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
TYP.	TYPICAL

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: E. GALLERIE | Date: AUGUST 2014 | ANSIF
Dwn by: E. GALLERIE | Ckd by: T. MATHEW | Task Order: 010
Reviewed by: M. POPPER | Contract no.: W912DQ-11-D-3004
Submitted by: K. TAN | Plot date: 8/2/2014 | Plot by: Gallerie, Ellen | Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL005.dwg

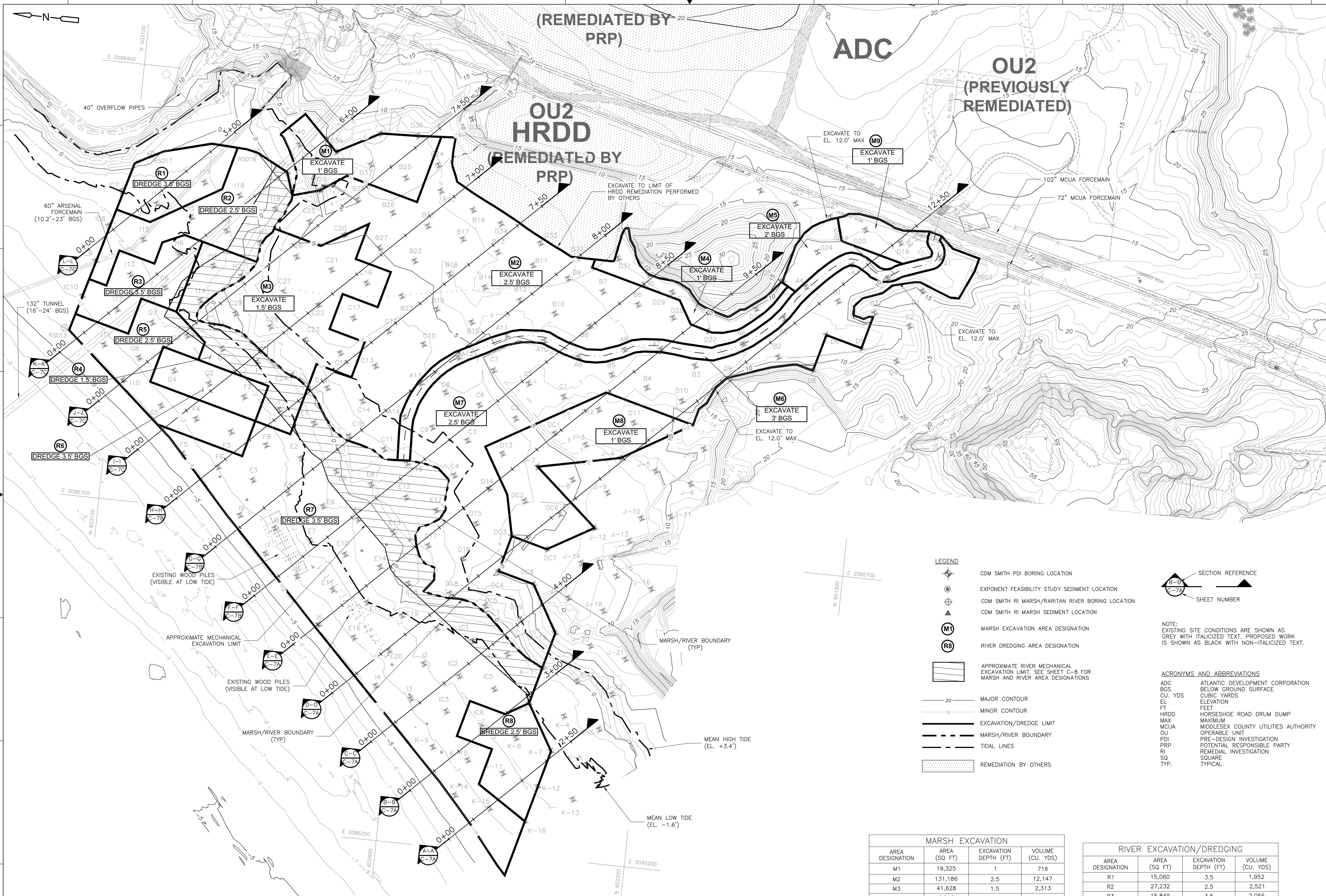
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

SEDIMENT STOCKPILE PLANS

SHEET NO.
C-5

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\CSTPL005.DWG



PLAN

1" = 60'

30 0 60

LEGEND

- CDM SMITH PDI BORING LOCATION
- EXPONENT FEASIBILITY STUDY SEDIMENT LOCATION
- CDM SMITH RI MARSH/RARITAN RIVER BORING LOCATION
- CDM SMITH RI MARSH SEDIMENT LOCATION
- M1 — MARSH EXCAVATION AREA DESIGNATION
- R8 — RIVER DREDGING AREA DESIGNATION
- APPROXIMATE RIVER MECHANICAL EXCAVATION LIMIT. SEE SHEET C-8 FOR MARSH AND RIVER AREA DESIGNATIONS
- 20 — MAJOR CONTOUR
- 18 — MINOR CONTOUR
- EXCAVATION/DREDGE LIMIT
- MARSH/RIVER BOUNDARY
- TIDAL LINES
- REMEDIATION BY OTHERS

SECTION REFERENCE — B–B / C–7A — SHEET NUMBER

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
BGS	BELOW GROUND SURFACE
CU. YDS	CUBIC YARDS
EL	ELEVATION
FT	FEET
HRDD	HORSESHOE ROAD DRUM DUMP
MAX	MAXIMUM
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
OU	OPERABLE UNIT
PDI	PRE-DESIGN INVESTIGATION
PRP	POTENTIAL RESPONSIBLE PARTY
RI	REMEDIAL INVESTIGATION
SQ	SQUARE
TYP.	TYPICAL

MARSH EXCAVATION

AREA DESIGNATION	AREA (SQ FT)	EXCAVATION DEPTH (FT)	VOLUME (CU. YDS)
M1	19,325	1	716
M2	131,186	2.5	12,147
M3	41,628	1.5	2,313
M4	9,910	1	367
M5	7,685	2	569
M6	21,842	3	2,427
M7	111,959	2.5	10,367
M8	33,967	1	1,258
M9	7,341	1	272
TOTAL			30,435

RIVER EXCAVATION/DREDGING

AREA DESIGNATION	AREA (SQ FT)	EXCAVATION DEPTH (FT)	VOLUME (CU. YDS)
R1	15,060	3.5	1,952
R2	27,232	2.5	2,521
R3	15,849	3.5	2,055
R4	20,281	1.5	1,127
R5	26,678	2.5	2,470
R6	10,800	3.5	1,400
R7	154,767	3.5	20,062
R8	16,200	2.5	1,500
TOTAL			33,088

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
NO. 24GE04395200

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Designed by: M. RAHMANI
Dwn by: E. LARSON
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/2/2014
Plot by: Gallerie, Ellen
Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL006.dwg

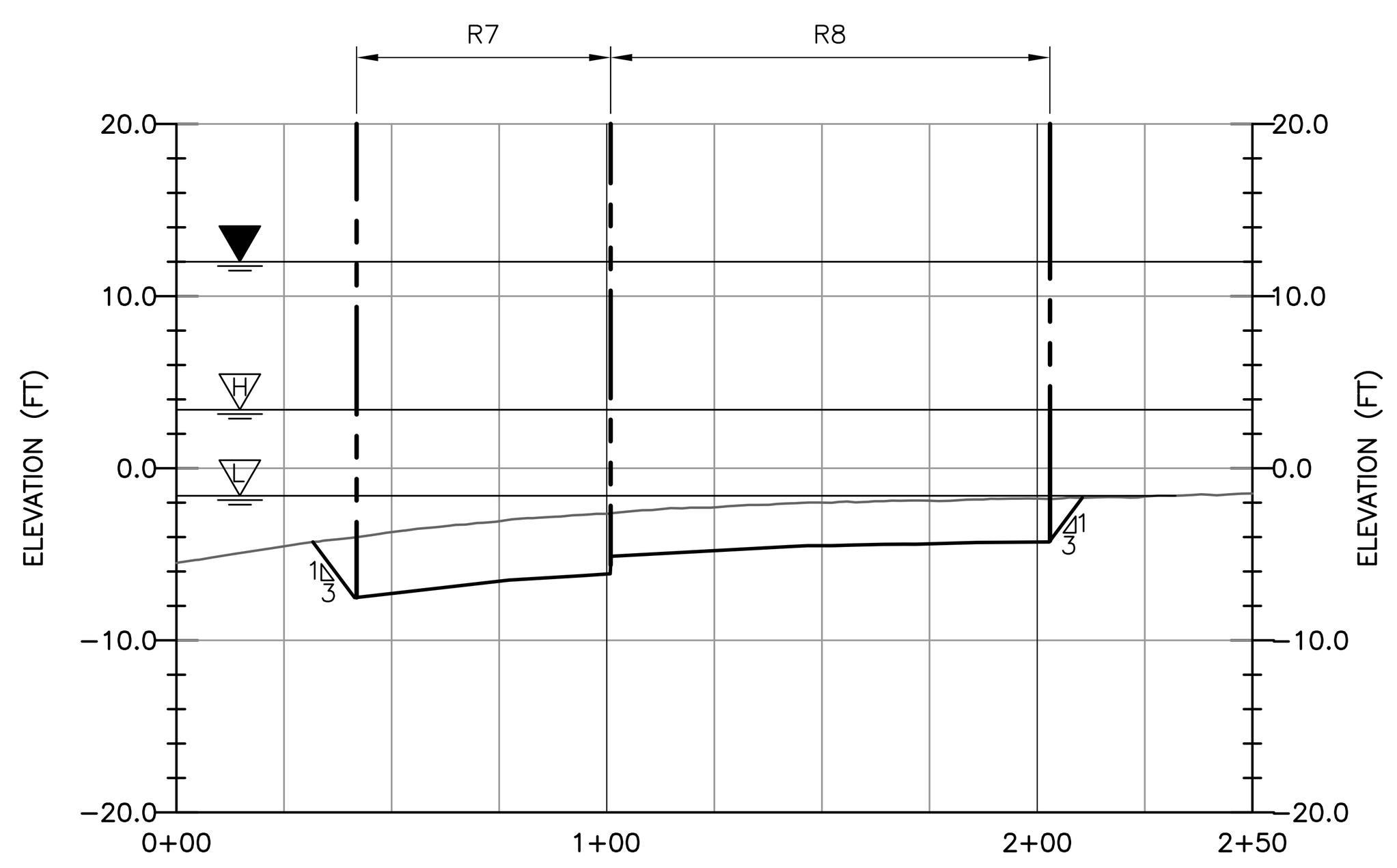
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

EXCAVATION/DREDGING PLAN

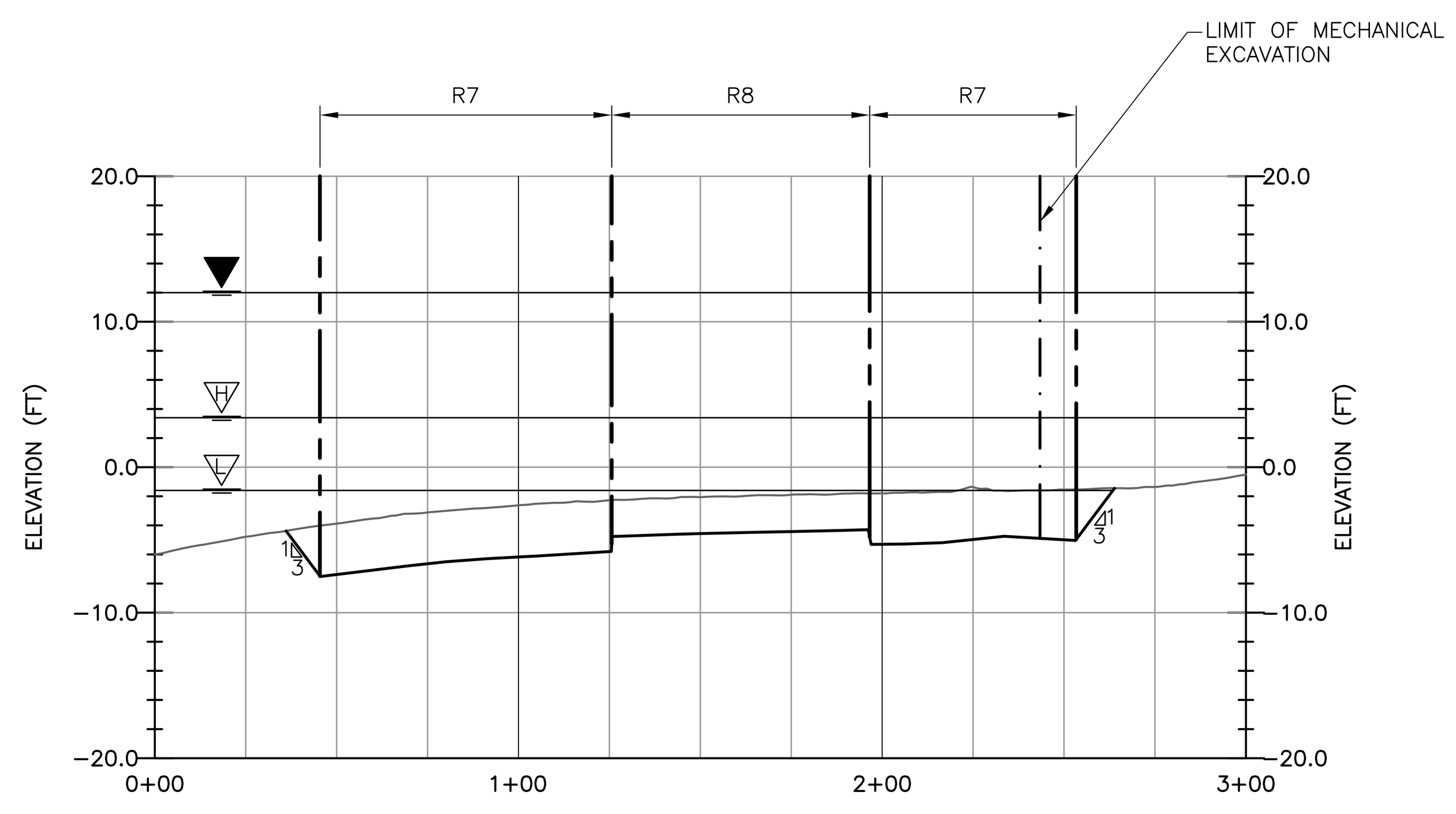
SHEET NO.
C-6

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\CSTPL006.DWG



SECTION A-A
SEE GRAPHIC SCALE C-6



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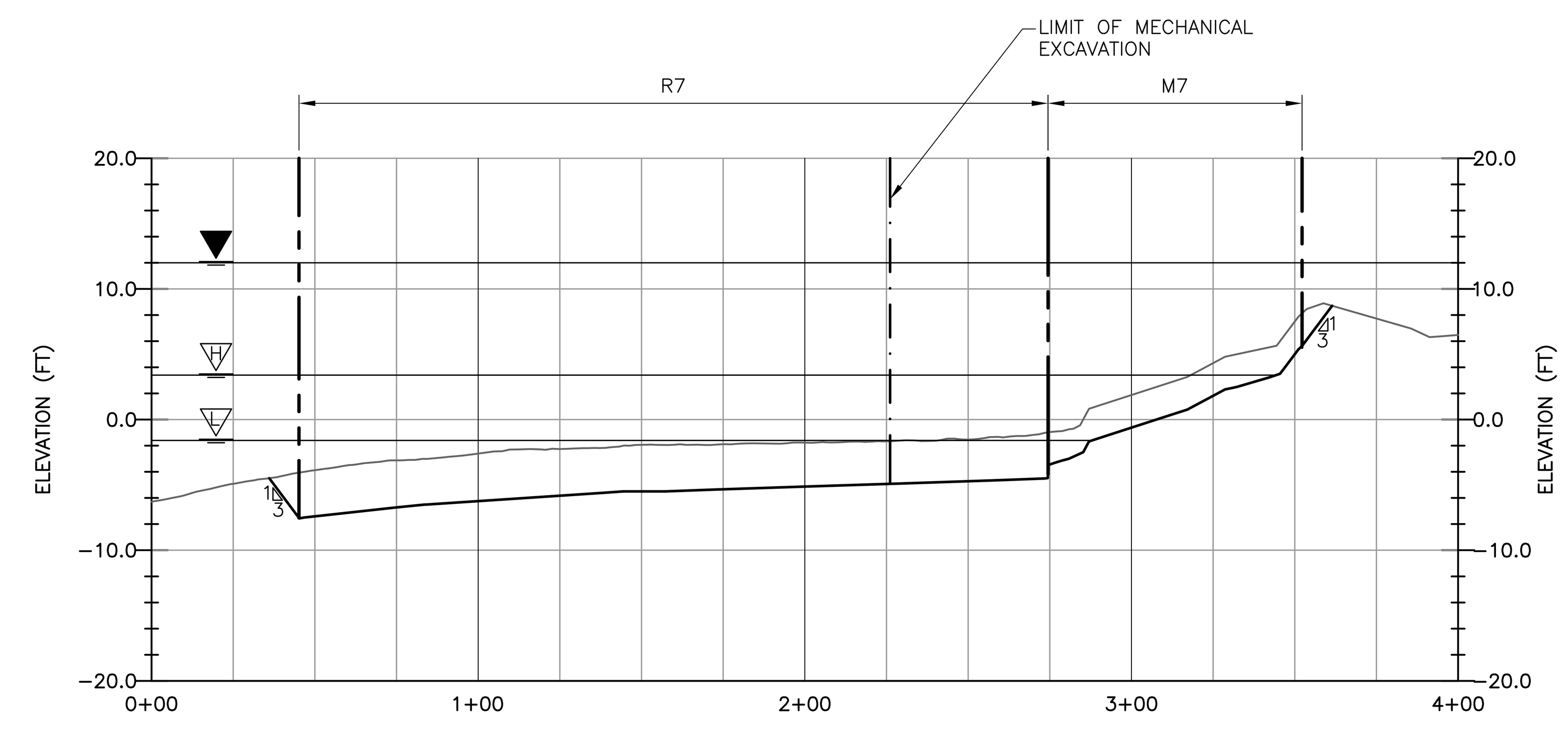
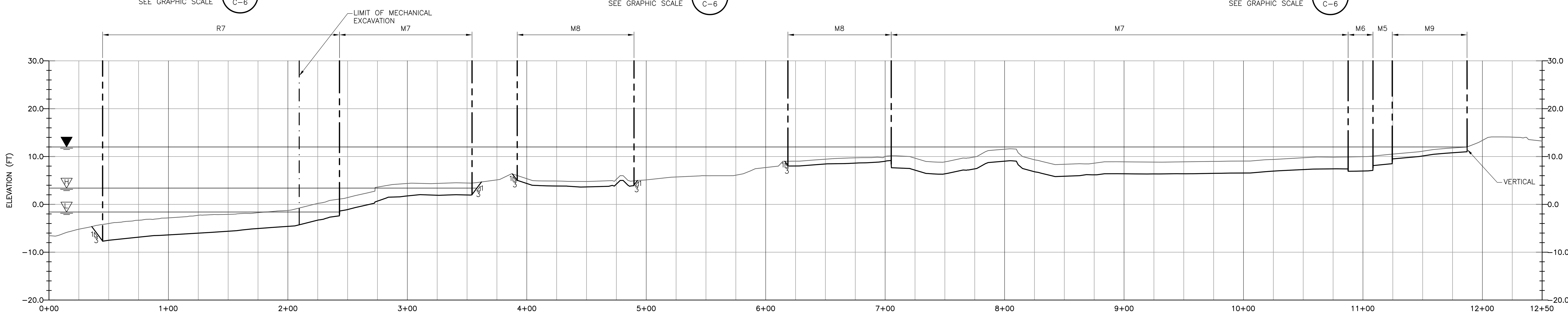
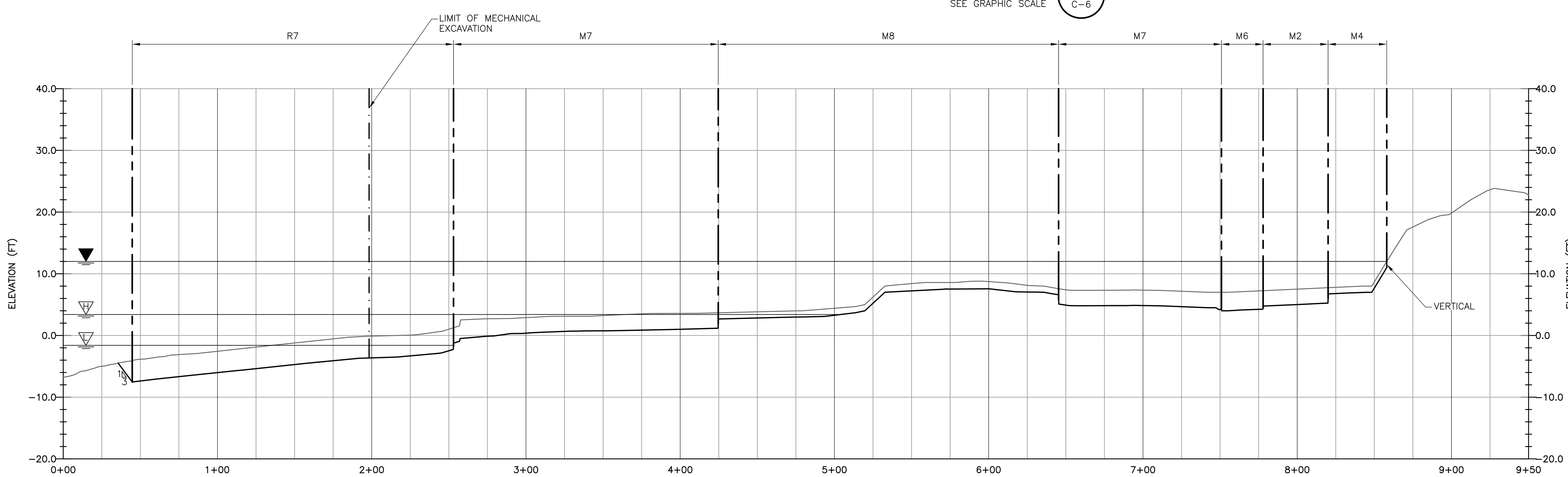
SEE GRAPHIC SCALE C-6



SECTION C-C
SEE GRAPHIC SCALE C-6



SECTION D-D
SEE GRAPHIC SCALE C-6



SECTION E-E
SEE GRAPHIC SCALE C-6

NOTES:

1. DREDGING SHALL BE PERFORMED TO THE EXTENTS OF THE DREDGE CELL BOUNDARY AT THE DESIGNATED DREDGE DEPTH. AT THE DREDGE CELL BOUNDARY THE CONTRACTOR SHALL DREDGE TO EXISTING SURFACE AT A 3H:1V SLOPE.
2. DREDGING SHALL NOT BE PERFORMED ABOVE THE 100–YEAR FLOOD ELEVATION (EL. 12.0). CONTRACTOR SHALL DREDGE AS DESCRIBED IN NOTE 1 TO EL. 11 AND THEN DREDGE VERTICALLY UP TO THE EXISTING SURFACE.

LEGEND:

- EXISTING SURFACE
- PROPOSED DREDGE SURFACE
- 100–YEAR FLOOD ELEVATION (+12.0)
- MEAN HIGH WATER ELEVATION (+3.4)
- MEAN LOW WATER ELEVATION (−1.6)

HORIZONTAL SCALE: 10 0 20
VERTICAL SCALE: 2.5 0 5

US Army Corps of Engineers Kansas City District

KERSHU TAN
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

Designed by: M. POPPER
Dwn by: J. MORENCY
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/2/2014
Plot by: Gallerie, Ellen
Scale: 1:1
File name: C07AXSSC.dwg

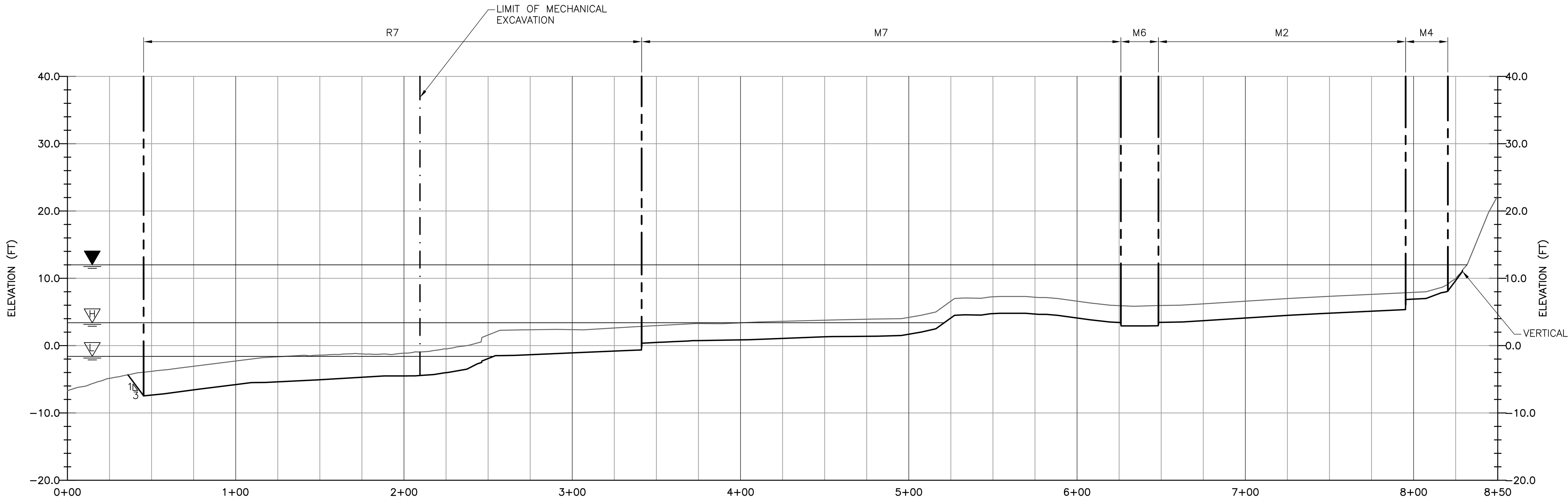
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

EXCAVATION CROSS SECTIONS I

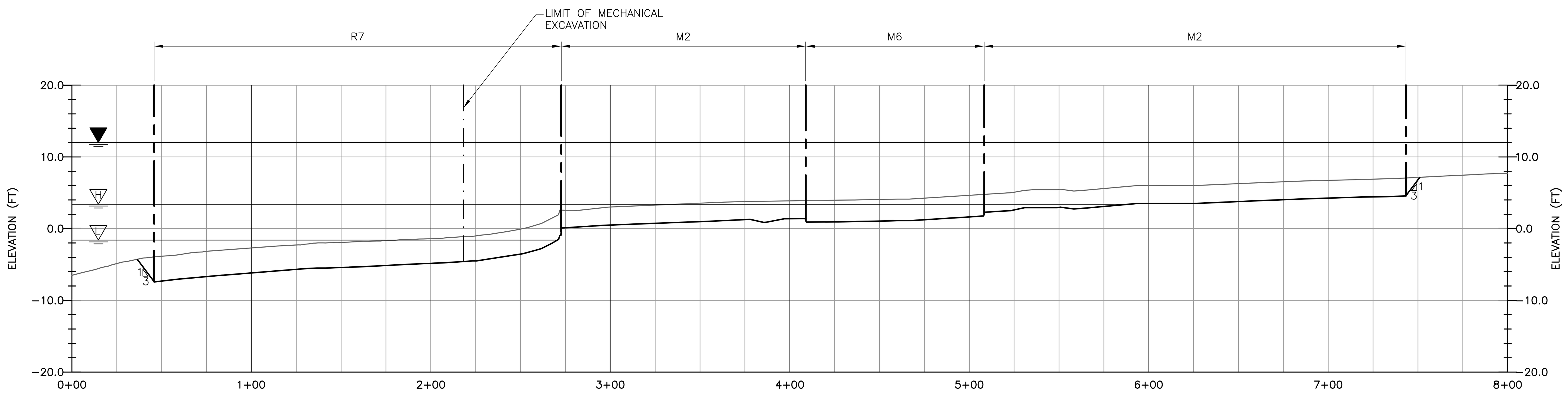
SHEET NO.
C-7A

100% DESIGN

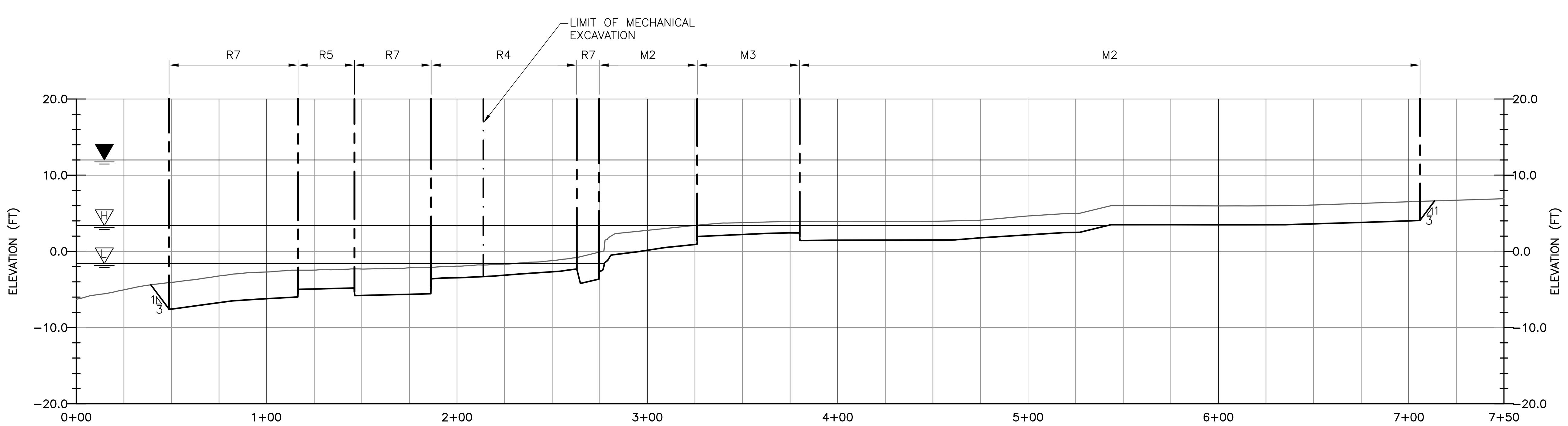
PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\C007XSSC.DWG



SECTION F-F
SEE GRAPHIC SCALE C-6



SECTION G-G
SEE GRAPHIC SCALE C-6



SECTION H-H
SEE GRAPHIC SCALE C-6

NOTES:

1. DREDGING SHALL BE PERFORMED TO THE EXTENTS OF THE DREDGE CELL BOUNDARY AT THE DESIGNATED DREDGE DEPTH. AT THE DREDGE CELL BOUNDARY THE CONTRACTOR SHALL DREDGE TO EXISTING SURFACE AT A 3H:1V SLOPE.
2. DREDGING SHALL NOT BE PERFORMED ABOVE THE 100-YEAR FLOOD ELEVATION (EL. 12.0). CONTRACTOR SHALL DREDGE AS DESCRIBED IN NOTE 1 TO EL. 11 AND THEN DREDGE VERTICALLY UP TO THE EXISTING SURFACE.

LEGEND:

- EXISTING SURFACE
- PROPOSED DREDGE SURFACE
- 100-YEAR FLOOD ELEVATION (+12.0)
- MEAN HIGH WATER ELEVATION (+3.4)
- MEAN LOW WATER ELEVATION (-1.6)

HORIZONTAL SCALE: 10 0 20
VERTICAL SCALE: 2.5 0 5

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER N0. 24GE04395200

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

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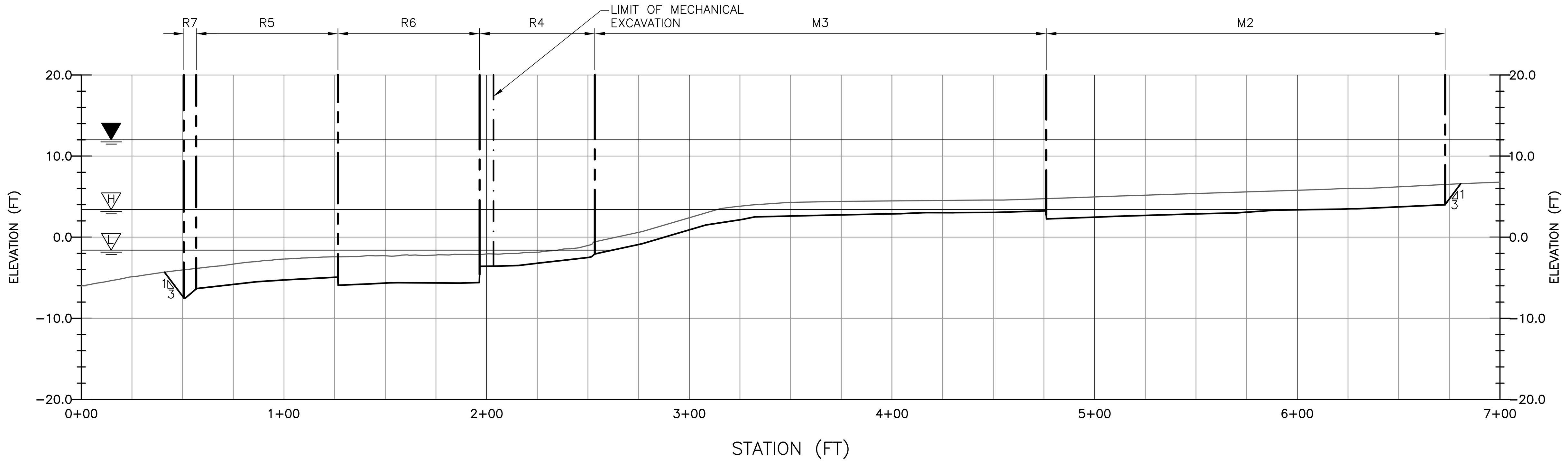
Dwn by: J. MORENCY
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/2/2014
Plot by: Gallerie, Ellen
Scale: 1:1
File name: C07BXSSC.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

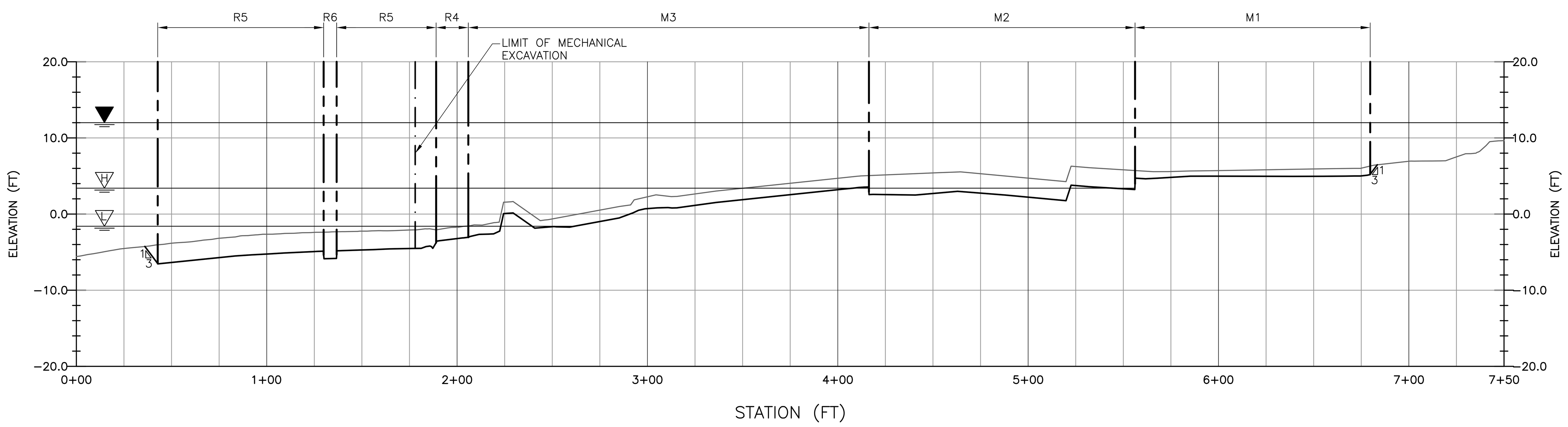
EXCAVATION CROSS SECTIONS II

SHEET NO.
C-7B

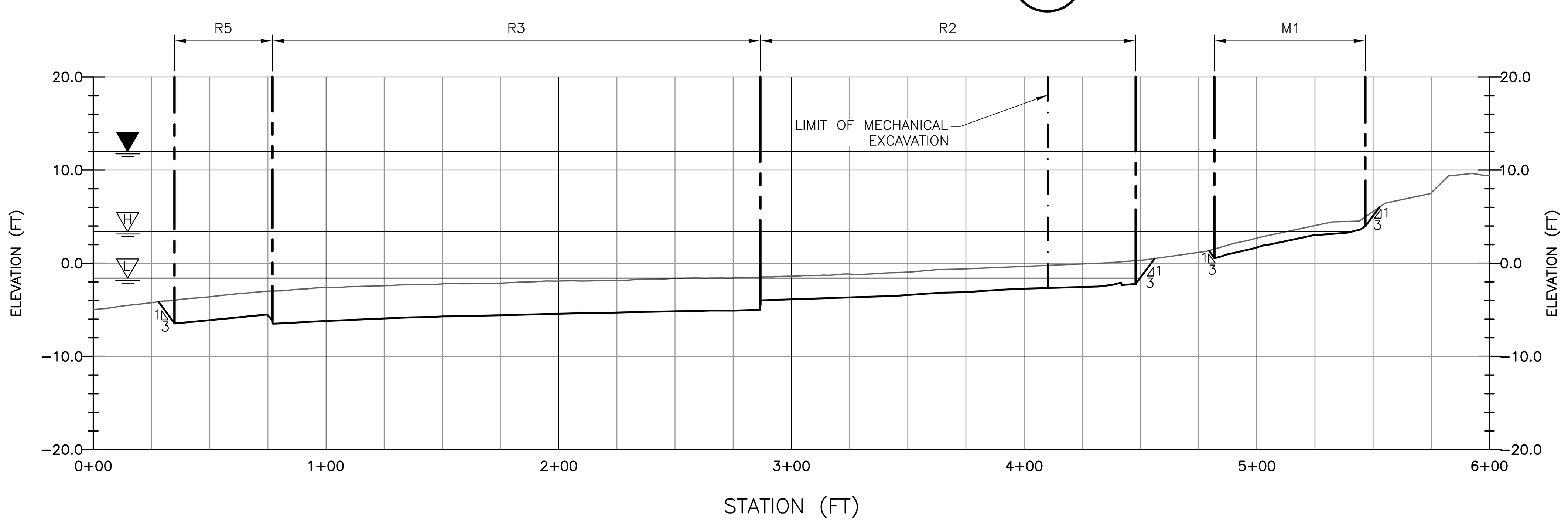
100% DESIGN



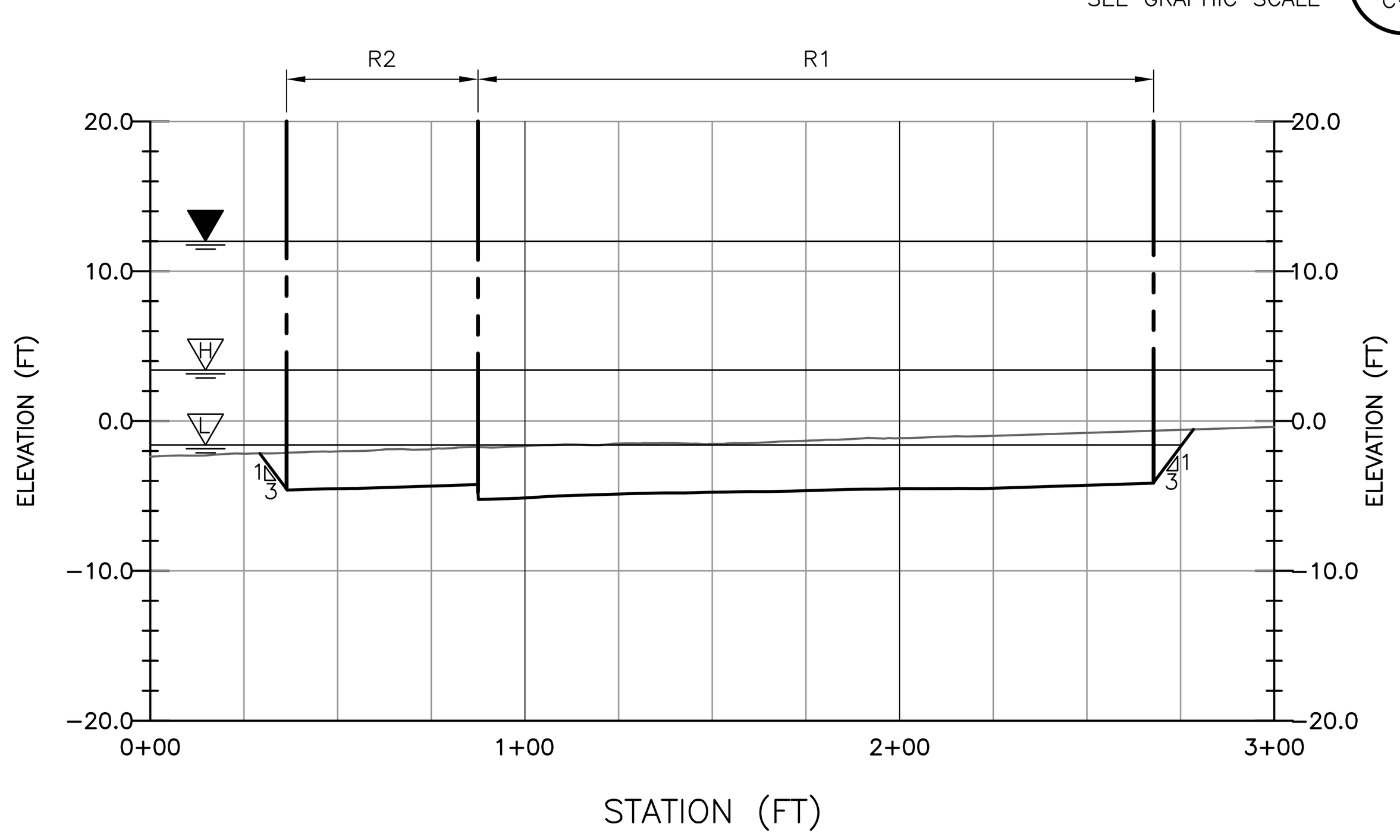
SECTION I-I
SEE GRAPHIC SCALE C-6



SECTION J-J
SEE GRAPHIC SCALE C-6



SECTION K-K
SEE GRAPHIC SCALE C-6



SECTION L-L
SEE GRAPHIC SCALE C-6

NOTES:

1. DREDGING SHALL BE PERFORMED TO THE EXTENTS OF THE DREDGE CELL BOUNDARY AT THE DESIGNATED DREDGE DEPTH. AT THE DREDGE CELL BOUNDARY THE CONTRACTOR SHALL DREDGE TO EXISTING SURFACE AT A 3H:1V SLOPE.
2. DREDGING SHALL NOT BE PERFORMED ABOVE THE 100−YEAR FLOOD ELEVATION (EL. 12.0). CONTRACTOR SHALL DREDGE AS DESCRIBED IN NOTE 1 TO EL. 11 AND THEN DREDGE VERTICALLY UP TO THE EXISTING SURFACE.

LEGEND:

- EXISTING SURFACE
- PROPOSED DREDGE SURFACE
- 100−YEAR FLOOD ELEVATION (+12.0)
- MEAN HIGH WATER ELEVATION (+3.4)
- MEAN LOW WATER ELEVATION (−1.6)

HORIZONTAL SCALE: 10 0 20
VERTICAL SCALE: 2.5 0 5

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

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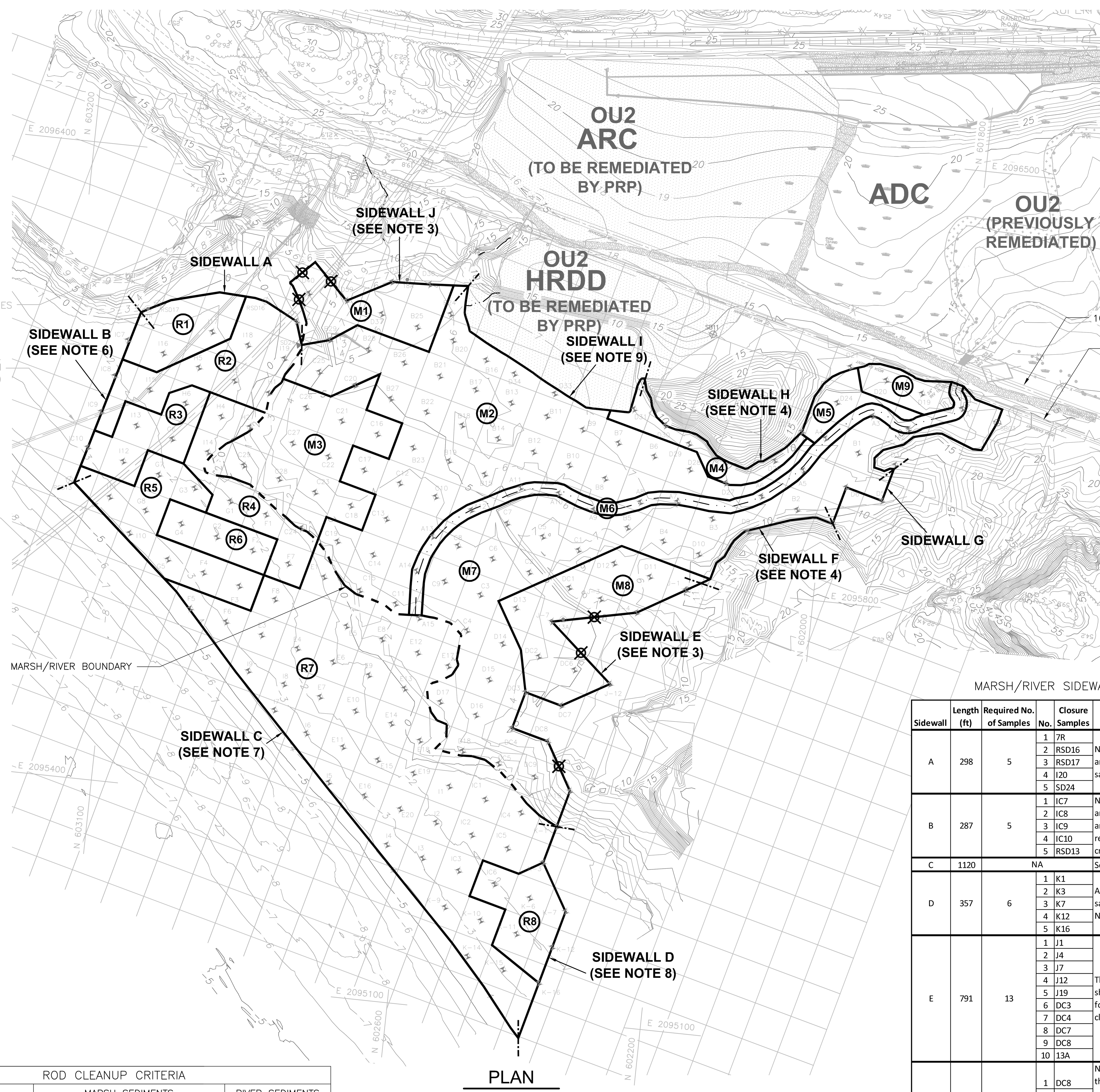
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

EXCAVATION CROSS SECTIONS III

SHEET NO.
C-7C

100% DESIGN



RIVER BOTTOM CLOSURE SAMPLES

Excavation Area	Area (Sq. Ft)	Required No. of Samples	No.	Closure Samples	Arsenic Results (mg/kg)		Mercury Results (mg/kg)		Closure Sample Types
R1	15060	4	1	I16-3.5-4.5	44.6	J	2.5	J	Documentation See Note 10
			2	I17-3.5-4.5	69.5	J	2.3	J	
			3	IC7-3.5-4.5	53.7	J	1.1	J	
R2	26476	7	1	H1-2.5-3.5	97.8		1.2		Confirmation
			2	H3-2.5-3.5	99.3	J	1.4	J	
			3	H5-2.5-3.5	32	J	1.7	J	
			4	I15-2.5-3.5	20.2	J	1.9	J	
			5	I18-2.5-3.5	84.1	J	1.7	J	
			6	I19-2.5-3.5	8.5		0.79		
			7	IC8-2.5-3.5	19.2		1.3	J	
			8	IC9-2.5-3.5	24		1.3		
R3	15849	4	1	G6-3.5-4.5	116	J	1.4	J	Documentation
			2	H6-3.5-4.5	68.3	J	2.3	J	
			3	I12-3.5-4.5	121	J	3.2	J	
			4	I13-3.5-4.5	67.3	J	2.7	J	
			5	IC10-3.5-4.5	69.4	J	2.2		
R4	20281	6	1	F1-1.5-2.5	33.9		0.7		Confirmation
			2	F7-1.5-2.5	77		1.5		
			3	G1-1.5-2.5	12.1		0.18	U	
			4	H2-1.5-2.5	26.8		0.35		
			5	H4-1.5-2.5	3.6	U	0.14	U	
			6	I14-1.5-2.5	25.5		0.2		
R5	26678	7	1	F3-2.5-3.5	61.6		1.6		Confirmation
			2	F4-2.5-3.5	31	J	0.21		
			3	G3-2.5-3.5	52.8		0.77		
			4	G5-2.5-3.5	35.4	J	0.37		
			5	G7-2.5-3.5	43.1	J	1.1		
			6	G8-2.5-3.5	60.4	J	1.1		
			7	I10-2.5-3.5	9.4		0.17	U	
			8	I11-2.5-3.5	85.6		1.5		
R6	10800	3	1	F2-3.5-4.5	48.2		0.56		Documentation
			2	G2-3.5-4.5	44.1		0.54		
			3	G4-3.5-4.5	86.8		1.3		
R8	16200	5	1	IC6-2.5-3.5	3.3		1.2		Confirmation
			2	K3-2.5-3.5	24.4		0.68		
			3	K6-2.5-3.5	60.2	J	0.64		
			4	K7-2.5-3.5	46.3	J	0.85		
			5	K11-2.5-3.5	23	J	0.46		
			6	K12-2.5-3.5	44.6	J	0.83		
			7	K16-2.5-3.5	80.5	J	1		
R7	154767	43	1	E1-3.5-4.5	26.8	J	0.97	J	Documentation
			2	E3-3.5-4.5	225	J	4.9	J	
			3	E4-3.5-4.5	202	J	4.1	J	
			4	E5-3.5-4.5	104	J	3	J	
			5	E6-3.5-4.5	193	J	4	J	
			6	E7-3.5-4.5	136	J	6.4	J	
			7	E8-3.5-4.5	166	J	3.2	J	
			8	E9-3.5-4.5	143	J	3.2		
			9	E10-3.5-4.5	200	J	5.1	J	
			10	E11-3.5-4.5	165	J	4.2	J	
			11	E12-3.5-4.5	181	J	3.7	J	
			12	E13-3.5-4.5	124	J	3.3	J	
			13	E14-3.5-4.5	128	J	2.1	J	
			14	E15-3.5-4.5	233	J	2.8	J	
			15	E16-3.5-4.5	144	J	4.8	J	
			16	E17-3.5-4.5	162	J	4	J	
			17	E18-3.5-4.5	129	J	2.9	J	
			18	E19-3.5-4.5	201	J	2.8	J	
			19	E20-3.5-4.5	188		2.7	J	
			20	F5-3.5-4.5	193	J	6.2	J	
			21	F6-3.5-4.5	203	J	3.3	J	
			22	F8-3.5-4.5	44.9		0.8		
			23	I1-3.5-4.5	70.2	J	0.68		
			24	I2-3.5-4.5	239	J	4.7	J	
			25	I3-3.5-4.5	110	J	3.2	J	
			26	I4-3.5-4.5	167	J	3.5	J	
			27	I5-3.5-4.5	149	J	4.2	J	
			28	I6-3.5-4.5	223	J	5.7	J	
			29	I7-3.5-4.5	135	J	8	J	
			30	I8-3.5-4.5	150	J	3.8	J	
			31	I9-3.5-4.5	120	J	4.2	J	
			32	IC1-3.5-4.5	141	J	3.5		
			33	IC2-3.5-4.5	27	J	1.1		
			34	IC3-3.5-4.5	204	J	3.3	J	
			35	IC4-3.5-4.5	100	J	1.6		
			36	IC5-3.5-4.5	74.6		1.1		
			37	K1-3.5-4.5	123		2.6		
			38	K3-3.5-4.5	34.8		0.65		
			39	K9-3.5-4.5	313	J	6	J	
			40	K10-3.5-4.5	192	J	3.9	J	
			41	K14-3.5-4.5	223	J	2.2	J	
			42	K15-3.5-4.5	75.4		1.1		
			43	K16-3.5-4.5	122	J	1.5		

NOTE: SHADED CELLS INDICATE CLOSURE SAMPLES ABOVE THE ROD CLEANUP CRITERIA.

MARSH BOTTOM CLOSURE SAMPLES

Excavation Area	Area (Sq. Ft)	Required No. of Samples	No.	Closure Samples	Arsenic Results (mg/kg)		Closure Sample Types
M1	19325	5	1	B25-1-2	159	J	Confirmation
			2	D36-1-2	13.3		
			3	D37-1-2	20.6		
			4	D38-1-2	5.9		
			5	D39-1-2	3	U	
			6	D40-1-2	15.8		
M2	131186	36	1	B6-2.5-3.5	142	J	Documentation
			2	B7-2.5-3.5	122	J	
			3	B8-2.5-3.5	156	J	
			4	B9-2.5-3.5	156	J	
			5	B10-2.5-3.5	198	J	
			6	B11-2.5-3.5	164	J	
			7	B12-2.5-3.5	145	J	
			8	B13-2.5-3.5	158		
			9	B14-2.5-3.5	110		
			10	B15-2.5-3.5	19	J	
			11	B16-2.5-3.5	153		
			12	B17-2.5-3.5	10.9		
			13	B18-2.5-3.5	161	J	
			14	B19-2.5-3.5	109	J	
			15	B20-2.5-3.5	150	J	
			16	B21-2.5-3.5	193	J	
			17	B22-2.5-3.5	56.1	J	
			18	B23-2.5-3.5	192	J	
			19	B24-2.5-3.5	62.7		
			20	B26-2.5-3.5	88.6	J	
			21	B27-2.5-3.5	51.4	J	
			22	B28-2.5-3.5	72.8		
			23	B29-2.5-3.5	116		
			24	C10-2.5-3.5	35.9	J	
			25	C11-2.5-3.5	143	J	
			26	C12-2.5-3.5	38	J	
			27	C13-2.5-3.5	133	J	
			28	C14-2.5-3.5	82.7	J	
			29	C15-2.5-3.5	15.5		
			30	C17-2.5-3.5	85.6	J	
			31	C19-2.5-3.5	143	J	
			32	C20-2.5-3.5	63.3		
			33	C25-2.5-3.5	193		
			34	D27-2.5-3.5	70.6	J	
			35	D28-2.5-3.5	163	J	
			36	D33-2.5-3.5	167	J	
			37	D34-2.5-3.5	194		
M3	41628	12	1	C16-1.5-2.5	7.2	J	Confirmation
			2	C18-1.5-2.5	12.4	J	
			3	C19-2.5-3.5	143	J	
			4	C20-1.5-2.5	130		
			5	C21-1.5-2.5	15.3		
			6	C22-1.5-2.5	20.1	J	
			7	C23-1.5-2.5	130	J	
			8	C24-1.5-2.5	57		
			9	C26-1.5-2.5	71.2	J	
			10	C27-1.5-2.5	54.9	J	
			11	C28-1.5-2.5	99.8	J	
			12	C29-1.5-2.5	27.6		
M4	9812	3	1	D26-1-2	14.4	J	Confirmation
			2	D27-1-2	101	J	
			3	D29-1-2	112	J	
			4	D30-1-2	62.5	J	
			5	D31-1-2	63.2	J	
M5	6952	2	1	D21-2-2.5	16	J	Confirmation
			2	D24-2-2.5	49.4	J	
			3	D25-2-2.5	2.7	J	
M6	21842	6	1	A1-3-4	255		Documentation
			2	A2-3-4	6.4		
			3	A3-3-4	131		
			4	A4-3-4	153	J	
			5	A5-3-4	6.2	J	
			6	A6-3-4	58.3	J	
			7	A7-3-4	155	J	
			8	A8-3-4	158	J	
			9	A9-3-4	118	J	
			10	A10-3-4	128		
			11	A11-3-4	161	J	
			12	A12-3-4	1120	J	
			13	A13-3-4	56.3	J	
			14	A14-3-4	61.6		
			15	A15-3-4	201	J	
M7	112254	31	1	B1-2.5-3.5	3.2	U	Documentation See Note 10
			2	B2-2.5-3.5	124	J	
			3	B3-2.5-3.5	136	J	
			4	B4-2.5-3.5	176	J	
			5	B5-2.5-3.5	102	J	
			6	C1-2.5-3.5	517	J	
			7	C2-2.5-3.5	150	J	
			8	C3-2.5-3.5	115	J	
			9	C4-2.5-3.5	76.3	J	
			10	C5-2.5-3.5	95.2	J	
			11	C6-2.5-3.5	10.9		
			12	C7-2.5-3.5	126	J	
			13	C8-2.5-3.5	63.7		
			14	C9-2.5-3.5	181	J	
			15	D5-2.5-3.5	3	UJ	
			16	D6-2.5-3.5	102	J	
			17	D8-2.5-3.5	3	UJ	
			18	D9-2.5-3.5	156		
			19	D10-2.5-3.5	151		
			20	D14-2.5-3.5	210	J	
			21	D15-2.5-3.5	446	J	
			22	D16-2.5-3.5	565	J	
			23	D17-2.5-3.5	280	J	
			24	D18-2.5-3.5	222	J	
			25	DC3-2.5-3.5	20.4		
			26	DC4-2.5-3.5	15.7		
			27	DC5-2.5-3.5	113	J	
			28	DC8-2.5-3.5	3.3	J	
			29	DC9-2.5-3.5	115	J	
			30	K1-2.5-3.5	114	J	
M8	33967	9	1	D11-1-2	112	J	Confirmation
			2	D12-1-2	141	J	
			3	D13-1-2	48.5	J	
			4	DC1-1-2	79.3		
			5	DC2-1-2	1.6	J	
			6	DC3-1-2	3.1	U	
			7	DC6-1-2	3.4	J	
			8	DC7-1-2	9.4	J	
			9	J1-1-2	11.9	U	
			10	J3-1-2	105	J	
			11	J7-1-2	119	J	
			12	J12-1-2	11.9		
M9	7341	2	1	D19-1-2	2	J	Confirmation
			2	D20-1-2	3.1	UJ	

NOTE: SHADED CELLS INDICATE CLOSURE SAMPLES ABOVE THE ROD CLEANUP CRITERIA.

MARSH/RIVER SIDEWALL CLOSURE SAMPLES

Sidewall	Length (ft)	Required No. of Samples	No.	Closure Samples	Comments
A	298	5	1	7R	No additional closure samples are required. All arsenic and mercury results for these five closure samples are below the ROD cleanup criteria.
			2	RSD16	
			3	RSD17	
			4	I20	
			5	SD24	
B	287	5	1	IC7	No additional closure samples are required. All arsenic sample results for these five closure samples are below the ROD cleanup criterion, and mercury results are only marginally above the ROD cleanup criterion. See Note 6.
			2	IC8	
			3	IC9	
			4	IC10	
			5	RSD13	
C	1120	NA			See Note 7.
D	357	6	1	K1	All arsenic and mercury results for these five closure samples are below the ROD cleanup criteria. See Note 8.
			2	K3	
			3	K7	
			4	K12	
			5	K16	
E	791	13	1	J1	Three additional closure samples will be collected as shown on this plan. All arsenic and mercury results for these ten closure samples are below the ROD cleanup criteria.
			2	J4	
			3	J7	
			4	J12	
			5	J19	
			6	DC3	
			7	DC4	
			8	DC7	
			9	DC8	
			10	13A	
F	251	4	1	DC8	No additional closure samples are required because the excavation limit is to the 100-YR Flood Elevation of 12 feet MSL and is bounded by these two closure samples. All arsenic and mercury results for these two closure samples are below the ROD cleanup criteria.
			2	DC9	
G	174	3	1	D3	No additional closure samples are required. All arsenic and mercury results for these four closure samples are below the ROD cleanup criteria.
			2	D5	
			3	D6	
			4	D8	
H	1033	17	1	SB03	No additional closure samples are required because the excavation limit is to the 100-YR Flood Elevation of 12 feet MSL and is bounded by these four closure samples. All arsenic and mercury results for these four closure samples are below the ROD cleanup criteria.
			2	D21	
			3	D25	
			4	D30	
I	421	NA			See Note 9.
J	433	7	1	D36	Three additional closure samples will be collected as shown on this plan. All arsenic and mercury results for these four closure samples are below the ROD cleanup criteria.
			2	D38	
			3	D39	
			4	18A	

Note: All sidewall closure sample data are included in the Design Analysis Report.

ROD CLEANUP CRITERIA

CONTAMINANT	UNITS	MARSH SEDIMENTS SURFACE 0–1 FT	MARSH SEDIMENTS SUBSURFACE [1] 1–3.0 FT or 1–2.5 FT	RIVER SEDIMENTS 0–3.5 FT
ARSENIC	MG/KG	32	160	100
MERCURY	MG/KG	2	NA	2

[1] THE MAXIMUM EXCAVATION DEPTH FOR MARSH SEDIMENT IS 2.5 FT BGS EXCEPT FOR SPD/ADC DRAINAGE CHANNEL AREA (20FT WIDE), WHICH IS 3.0 FT BGS.

LEGEND

- POST EXCAVATION SIDEWALL SAMPLE TO BE COLLECTED BY CONTRACTOR
- CLOSURE SAMPLE
- 60 x 60 GRID
- M1 MARSH EXCAVATION AREA DESIGNATION
- R8 RIVER DREDGING AREA DESIGNATION
- 20 MAJOR CONTOUR
- 18 MINOR CONTOUR
- EXCAVATION/DREDGE LIMIT
- MARSH/RIVER BOUNDARY
- REMEDIATION BY OTHERS

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
ARC	ATLANTIC RESOURCES CORPORATION
BGS	BELOW GROUND SURFACE
FT	FEET
HRDD	HORSESHOE ROAD DRUM DUMP
J	RESULT IS ESTIMATED
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
MG/KG	MILLIGRAM PER KILOGRAM
MSL	MEAN SEA LEVEL
NJDEP	NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
OU	OPERABLE UNIT
PRP	POTENTIAL RESPONSIBLE PARTY
ROD	RECORD OF DECISION
U	RESULT IS NON-DETECT
YR	YEAR

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

NOTES:

1. THE NJDEP VERIFICATION REQUIREMENTS FOR CLOSURE SAMPLES AT THE HORSESHOE ROAD SUPERFUND SITE ARE ONE BOTTOM SAMPLE FOR EVERY 3,600 SQUARE FEET AND ONE SIDEWALL SAMPLE FOR EVERY 60 LINEAR FEET OF EXPOSED SIDEWALL.
2. THIS PLAN SHOWS EXISTING CLOSURE SAMPLES FROM PAST INVESTIGATIONS AS WELL AS THE POST–EXCAVATION CONFIRMATION SAMPLES TO BE COLLECTED BY THE CONTRACTOR. TOGETHER THESE SAMPLES WILL BE USED TO MEET THE NJDEP EXCAVATION VERIFICATION REQUIREMENTS.
3. THE EXISTING CLOSURE SAMPLES AS SHOWN ON THIS PLAN MEET THE NJDEP EXCAVATION VERIFICATION REQUIREMENTS FOR ALL EXCAVATION/DREDGING AREAS, WITH THE EXCEPTION OF EXCAVATION AREAS M1 AND M8. THE SIDEWALL POST–EXCAVATION CONFIRMATION SAMPLES COLLECTED FROM EXCAVATION AREAS M1 AND M8 SHALL BE ANALYZED FOR ARSENIC AND MERCURY AND COMPARED TO THE SITE CLEANUP CRITERIA. SECONDARY EXCAVATION, IF REQUIRED BASED ON THE POST–EXCAVATION CONFIRMATION SAMPLE RESULTS, WILL BE PERFORMED ONLY WITH THE APPROVAL OF THE GOVERNMENT AND IN ACCORDANCE WITH SPECIFICATION SECTION 02111.
4. EXISTING CLOSURE SAMPLES INCLUDE CONFIRMATION SAMPLES AND DOCUMENTATION SAMPLES. CONFIRMATION SAMPLES ARE DESIGNATED FOR AREAS WHERE EXCAVATION DEPTHS ARE LESS THAN THE MAXIMUM ROD EXCAVATION DEPTHS AND/OR THE PERIMETER EXCAVATION LIMIT IS BELOW THE 100–YR FLOOD ELEVATION OF 12.0 FT MSL. DOCUMENTATION SAMPLES ARE DESIGNATED FOR AREAS WHERE EXCAVATION DEPTHS ARE THE MAXIMUM ROD EXCAVATION DEPTHS AND/OR PERIMETER EXCAVATION LIMITS HAVE BEEN SET BY EPA (MARSH – 100–YR FLOOD ELEVATION OF 12.0 FT MSL; RIVER – ELEVATION OF –4.0 FT MSL ALONG THE NORTHWESTERN EXCAVATION LIMIT AND BORINGS IC–7 THROUGH IC–10 ALONG THE NORTHERN EXCAVATION LIMIT).
5. NO EXCAVATION/DREDGING SHALL BE PERFORMED BEYOND THE EXCAVATION LIMITS SHOWN ON THIS PLAN WITHOUT THE GOVERNMENT'S APPROVAL.
6. PER EPA'S DIRECTION, THE EXCAVATION LIMIT ALONG THE NORTH SIDE OF THE DREDGING AREA IS BOUNDED BY BORINGS IC7, IC8, IC9, IC10, AND RSD 13 BASED ON ARSENIC ANALYTICAL RESULTS.
7. PER EPA'S DIRECTION, THE FINAL HORIZONTAL EXCAVATION LIMIT ALONG SIDEWALL C EXTENDS TO THE ELEVATION OF –4.0 FT MSL.
8. FOR DREDGING AREA R8, SIDEWALL D, EXISTING CLOSURE SAMPLES ARE ONE SHORT OF THE REQUIRED NUMBER OF CLOSURE SAMPLES. NO ADDITIONAL CLOSURE SAMPLES ARE REQUIRED BASED ON THE DREDGING LIMIT AND EXISTING CLOSURE SAMPLE ANALYTICAL RESULTS.
9. NO CLOSURE SAMPLES ARE REQUIRED ALONG SIDEWALL I BECAUSE THE EXCAVATION LIMIT IS TO THE HRDD EXCAVATION LIMIT, TO BE REMEDIATED BY THE PRP.
10. FOR DREDGING AREA R1 AND EXCAVATION AREA M7, EXISTING BOTTOM CLOSURE SAMPLES ARE ONE SHORT OF THE REQUIRED NUMBER OF CLOSURE SAMPLES. NO ADDITIONAL CLOSURE SAMPLES ARE REQUIRED BECAUSE DREDGING AREA R1 AND EXCAVATION AREA M7 ARE BEING DREDGED/EXCAVATED TO THE MAXIMUM ROD EXCAVATION DEPTHS OF 3.5 FT AND 2.5 FT, RESPECTIVELY.

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: M. RAHMANI
Dwn by: E. LARSON
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/1/2014
Plot by: Hammond, Benjamin H.
Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL008.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

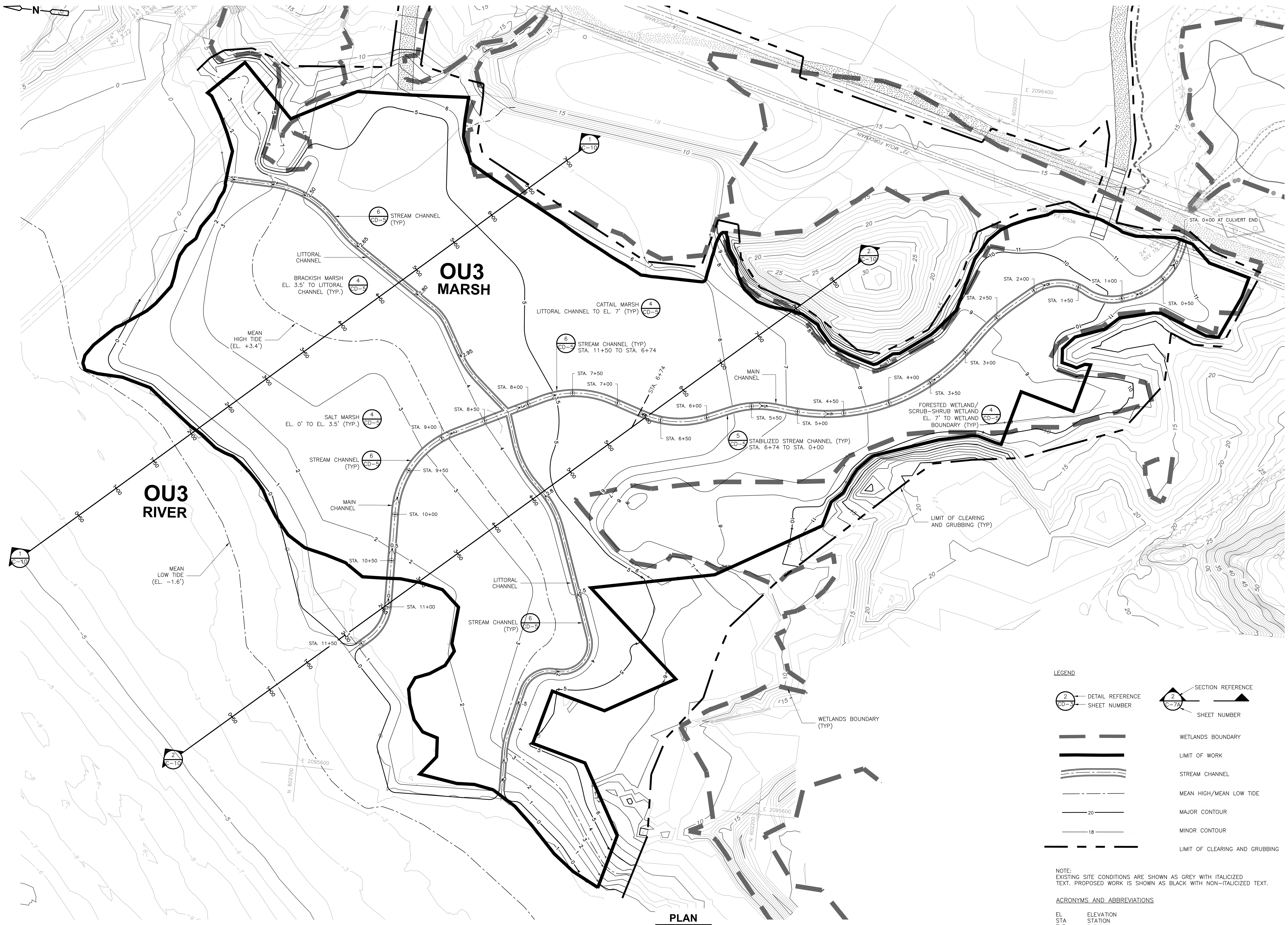
CLOSURE SAMPLING PLAN

SHEET NO.

C-8

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\CSTPL008.DWG



LEGEND

2 / CD-3	DETAIL REFERENCE / SHEET NUMBER
2 / C-7A	SECTION REFERENCE / SHEET NUMBER
	WETLANDS BOUNDARY
	LIMIT OF WORK
	STREAM CHANNEL
	MEAN HIGH/MEAN LOW TIDE
20	MAJOR CONTOUR
18	MINOR CONTOUR
	LIMIT OF CLEARING AND GRUBBING

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

EL	ELEVATION
STA	STATION
TYP	TYPICAL

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: D. DUNK | Date: AUGUST 2014 | ANSIF
Dwn by: E. LARSON | Ckd by: M. POPPER | Task Order: 010
Reviewed by: T. MATHEW | Contract no.: W912DQ-11-D-3004
Submitted by: K. TAN | Plot date: 8/2/2014 Plot by: Gallerie, Ellen Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

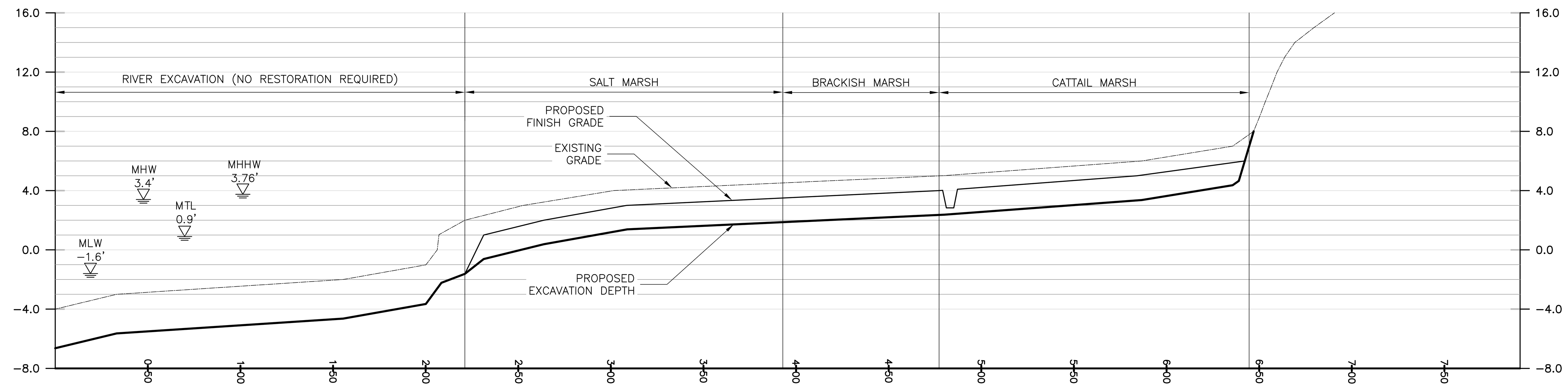
File name: CSTPL009.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

MARSH RESTORATION GRADING PLAN

SHEET NO.
C-9

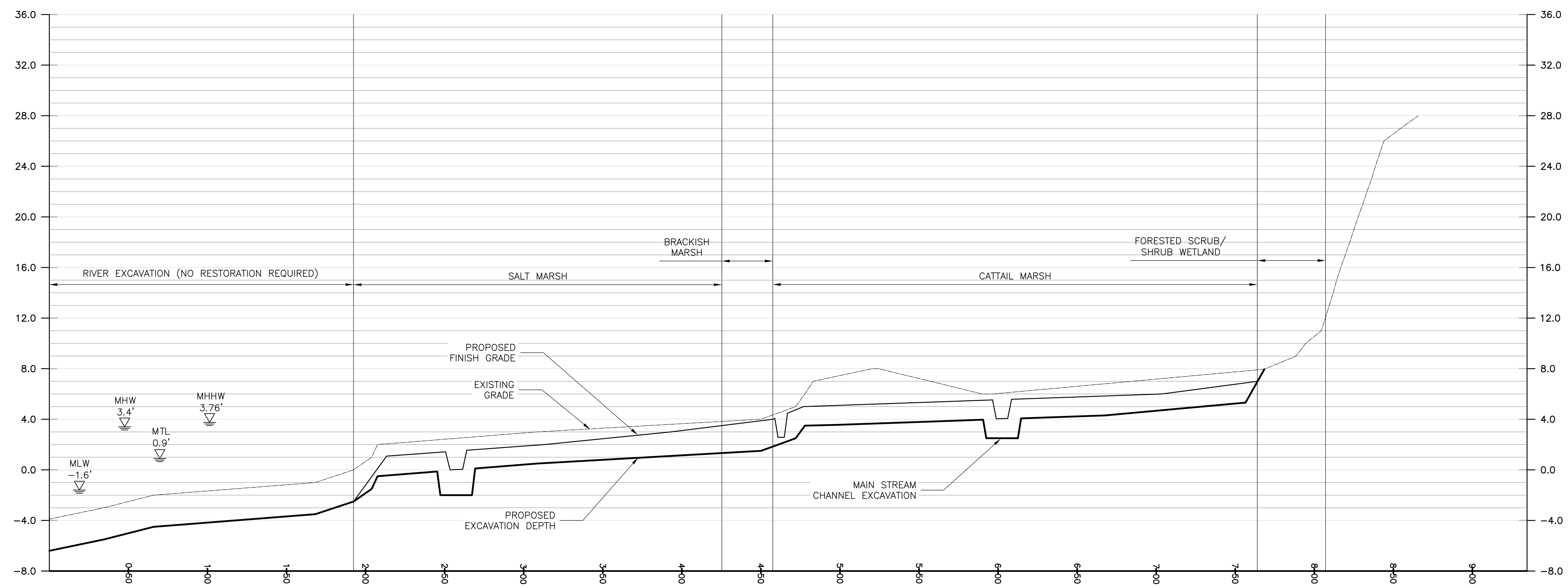
100% DESIGN



SECTION 1
AS NOTED C-9

HORIZONTAL
1" = 40'
20 0 40

VERTICAL
1" = 5'
2 0 4



SECTION 2
AS NOTED C-9

HORIZONTAL
1" = 40'
20 0 40

VERTICAL
1" = 5'
2 0 4

LEGEND:

MLW
−1.6'
WATER LEVEL INDICATOR

		DATUM:	
MHHW	(MEAN HIGH HIGH WATER)	EL. +3.76'	N.G.V.D 1929
MHW	(MEAN HIGH WATER)	EL. +3.4'	N.G.V.D 1929
MTL	(MEAN TIDE LEVEL)	EL. +0.9'	N.G.V.D 1929
MLW	(MEAN LOW WATER)	EL. −1.6'	N.G.V.D 1929

EXISTING GRADE

PROPOSED GRADE

PROPOSED EXCAVATION DEPTH

US Army Corps
of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

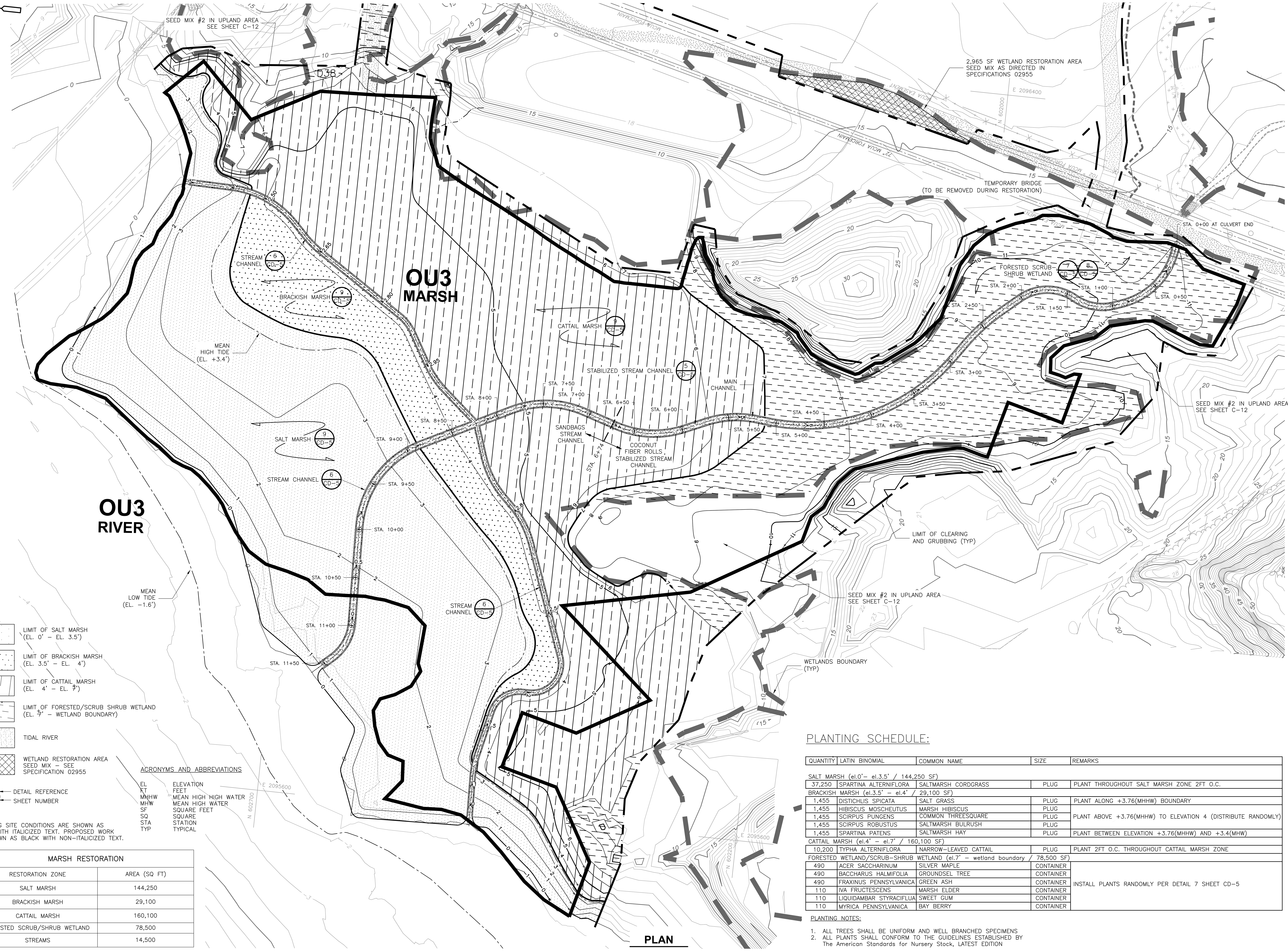
Designed by: D. DUNK
Dwn by: E. LARSON
Ckd by: M. POPPER
Reviewed by: T. MATHEW
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 7/31/2014
Plot by: Gallerie, Ellen
Scale: 1:1
File name: CSTPL010.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

WETLAND RESTORATION SECTIONS

SHEET NO.
C-10

100% DESIGN



LEGEND

- LIMIT OF SALT MARSH (EL. 0' – EL. 3.5')
- LIMIT OF BRACKISH MARSH (EL. 3.5' – EL. 4')
- LIMIT OF CATTAIL MARSH (EL. 4' – EL. 7')
- LIMIT OF FORESTED/SCRUB SHRUB WETLAND (EL. 7' – WETLAND BOUNDARY)
- TIDAL RIVER
- WETLAND RESTORATION AREA SEED MIX – SEE SPECIFICATION 02955
- H / CD-3 — DETAIL REFERENCE / SHEET NUMBER

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON-ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

EL	ELEVATION
FT	FEET
MHHW	MEAN HIGH HIGH WATER
MHW	MEAN HIGH WATER
SF	SQUARE FEET
SQ	SQUARE
STA	STATION
TYP	TYPICAL

MARSH RESTORATION

RESTORATION ZONE	AREA (SQ FT)
SALT MARSH	144,250
BRACKISH MARSH	29,100
CATTAIL MARSH	160,100
FORESTED SCRUB/SHRUB WETLAND	78,500
STREAMS	14,500

PLANTING SCHEDULE:

QUANTITY	LATIN BINOMIAL	COMMON NAME	SIZE	REMARKS
SALT MARSH (el.0'– el.3.5' / 144,250 SF)				
37,250	SPARTINA ALTERNIFLORA	SALTMARSH CORDGRASS	PLUG	PLANT THROUGHOUT SALT MARSH ZONE 2FT O.C.
BRACKISH MARSH (el.3.5' – el.4' / 29,100 SF)				
1,455	DISTICHLIS SPICATA	SALT GRASS	PLUG	PLANT ALONG +3.76(MHHW) BOUNDARY
1,455	HIBISCUS MOSCHEUTUS	MARSH HIBISCUS	PLUG	PLANT ABOVE +3.76(MHHW) TO ELEVATION 4 (DISTRIBUTE RANDOMLY)
1,455	SCIRPUS PUNGENS	COMMON THREESQUARE	PLUG	
1,455	SCIRPUS ROBUSTUS	SALTMARSH BULRUSH	PLUG	
1,455	SPARTINA PATENS	SALTMARSH HAY	PLUG	PLANT BETWEEN ELEVATION +3.76(MHHW) AND +3.4(MHW)
CATTAIL MARSH (el.4' – el.7' / 160,100 SF)				
10,200	TYPHA ALTERNIFLORA	NARROW–LEAVED CATTAIL	PLUG	PLANT 2FT O.C. THROUGHOUT CATTAIL MARSH ZONE
FORESTED WETLAND/SCRUB–SHRUB WETLAND (el.7' – wetland boundary / 78,500 SF)				
490	ACER SACCHARINUM	SILVER MAPLE	CONTAINER	INSTALL PLANTS RANDOMLY PER DETAIL 7 SHEET CD–5
490	BACCHARUS HALMIFOLIA	GROUNDSEL TREE	CONTAINER	
490	FRAXINUS PENNSYLVANICA	GREEN ASH	CONTAINER	
110	IVA FRUCTESCENS	MARSH ELDER	CONTAINER	
110	LIQUIDAMBAR STYRACIFLUA	SWEET GUM	CONTAINER	
110	MYRICA PENNSYLVANICA	BAY BERRY	CONTAINER	

PLANTING NOTES:

1. ALL TREES SHALL BE UNIFORM AND WELL BRANCHED SPECIMENS
2. ALL PLANTS SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY The American Standards for Nursery Stock, LATEST EDITION

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: D. DUNK	Date: AUGUST 2014	ANSIF
Dwn by: E. LARSON	Ckd by: M. POPPER	Task Order: 010
Reviewed by: T. MATHEW	Contract no.: W912DQ-11-D-3004	
Submitted by: K. TAN	Plot date: 8/2/2014 Plot by: Gallerie, Ellen Scale: 1:1	

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

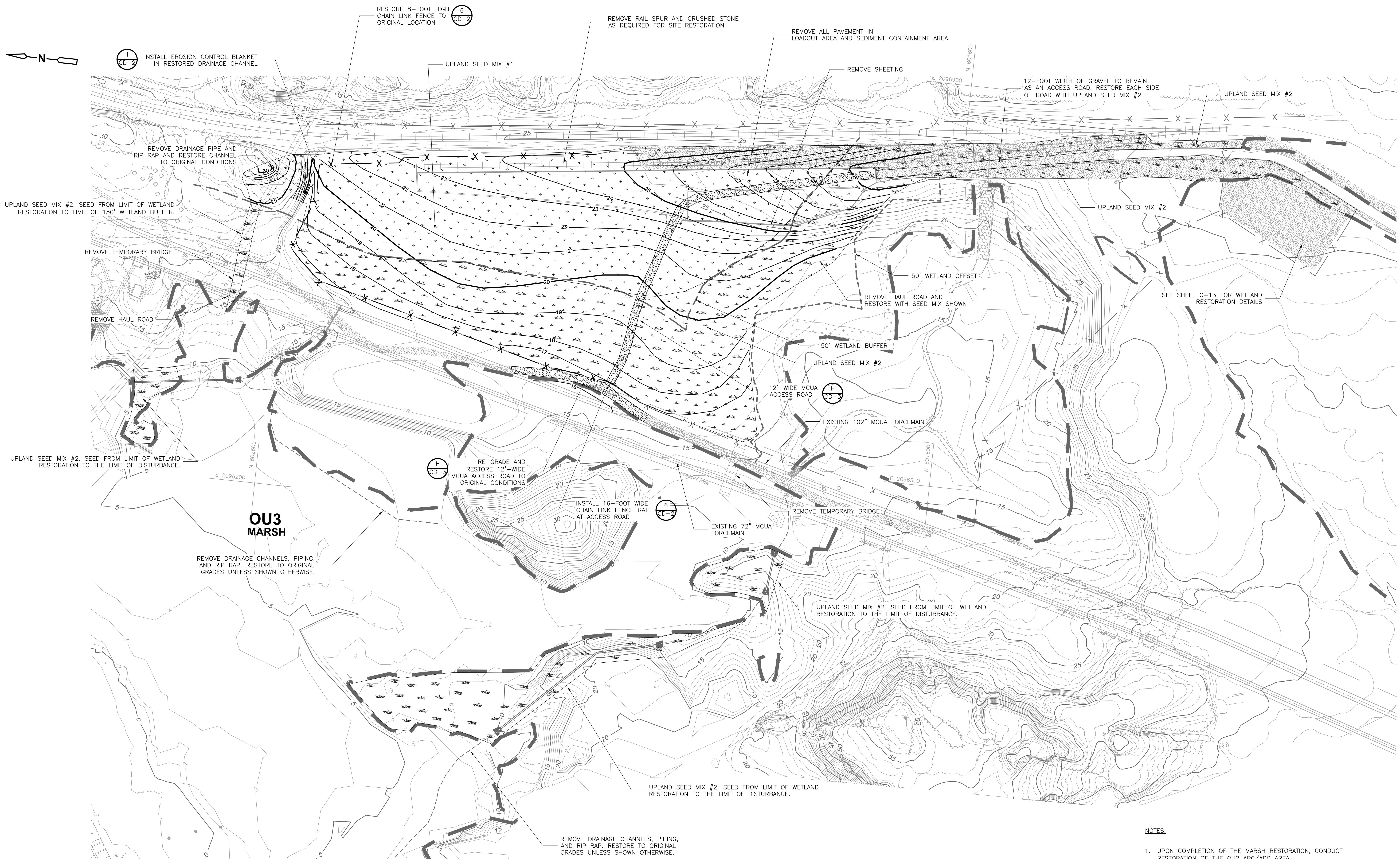
File name: CSTPL011.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

MARSH RESTORATION PLANTING PLAN

SHEET NO.
C-11

100% DESIGN



LEGEND

- MAJOR CONTOUR (20)
- MINOR CONTOUR (18)
- FENCE (X)
- GRAVEL
- UPLAND SEED MIX #1
- UPLAND SEED MIX #2
- DRAINAGE CHANNEL
- DRAINAGE PIPE
- RIP RAP
- 150-FOOT WETLAND BUFFER
- 50-FOOT WETLAND BUFFER
- RAIL ROAD TRACKS
- PRECAST CONCRETE BARRIER
- CURB
- H — DETAIL REFERENCE
- CD-3 — SHEET NUMBER

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
ARC	ATLANTIC RESOURCES CORPORATION
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
OU	OPERABLE UNIT

PLAN

1" = 60'

30 0 60

NOTES:

1. UPON COMPLETION OF THE MARSH RESTORATION, CONDUCT RESTORATION OF THE OU2 ARC/ADC AREA.
2. REMOVE THE SEDIMENT CONTAINMENT AREA, INCLUDING ALL PAVEMENT, CONTAINMENT WALLS, AND RAMPS.
3. REMOVE TEMPORARY BRIDGES AND ACCESS ROAD MATERIALS.
4. AT THE LOADOUT AREA, REMOVE PAVEMENT, CURBS, RAIL SPUR, AND GRAVEL AS REQUIRED FOR RESTORATION ACTIVITIES.
5. PAVING MATERIALS, SHEETING, AND CONCRETE WILL BE RECYCLED AT AN APPROVED FACILITY.
6. RE-GRADE SITE AS SHOWN FOR POSITIVE DRAINAGE.
7. AREAS WITHIN THE 150-FOOT WETLANDS BUFFER SHALL BE RESTORED WITH UPLAND SEED MIX #2. ALL OTHER DISTURBED AREAS SHALL BE RESTORED WITH UPLAND SEED MIX #1. SEED MIXES #1 AND #2 SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02921.
8. WETLANDS RESTORATION DETAILS ARE SHOWN ON SHEETS C-9 AND C-11.

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
NO. 24GE04395200

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Designed by: E. GALLERIE
Dwn by: E. GALLERIE
Ckd by: T. MATHEW
Reviewed by: M. POPPER
Submitted by: K. TAN
Date: AUGUST 2014
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/2/2014
Plot by: Gallerie, Ellen
Scale: 1:1
ANSIF

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CSTPL012.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

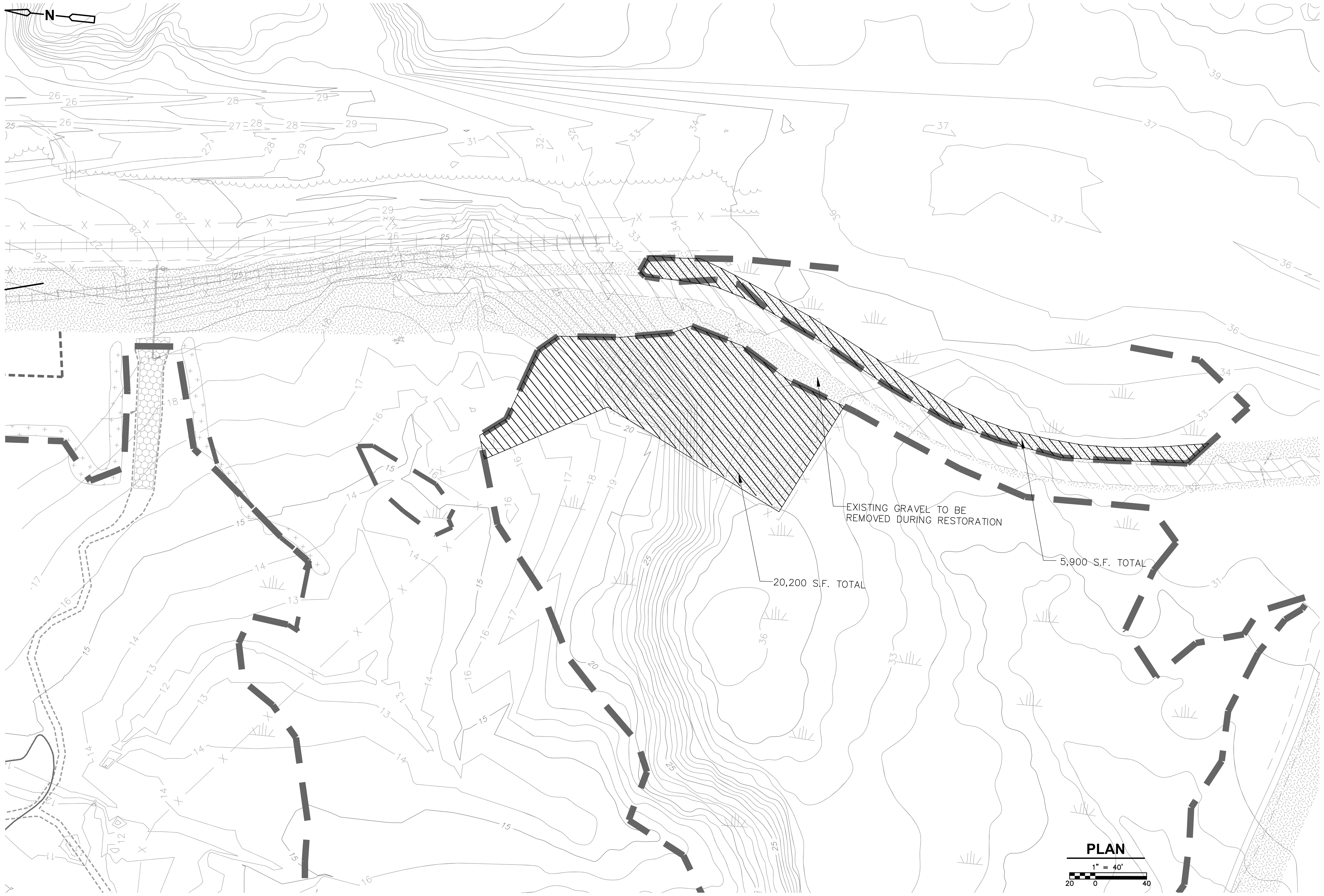
UPLAND SITE RESTORATION PLAN

SHEET NO.

C-12

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\CSTPL012.DWG



PLANTING NOTES:

1. PLANT 400 TREES PER ACRE (1–1½ IN. AT 20 FEET ON CENTER) IN RANDOM PATTERN WITHIN EACH COMMUNITY.

2. PLANT 200 SHRUBS PER ACRE (+/– 15 FEET ON CENTER) IN RANDOM PATTERN WITHIN EACH COMMUNITY.

3. IN FORESTED WETLAND, PLANT GROUND COVER IN SINGLE SPECIES CLUMPS OF 10 PLANTS PER CLUMP SPACED 1–FOOT ON CENTER WITHIN EACH CLUMP, CLUMPS SPACED 40 FEET ON CENTER (APPROXIMATELY 27 CLUMPS PER ACRE).

4. AFTER PLANTING TREES, SHRUBS AND GROUND COVER IN THE WOODED WETLAND, SOW WETLAND SEED MIX, AS SPECIFIED, THROUGHOUT THE WOODED WETLAND AT SPECIFIED RATE OR PER SUPPLIER RECOMMENDATIONS.

5. WETLAND SEED MIX SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTION 02955.

LEGEND

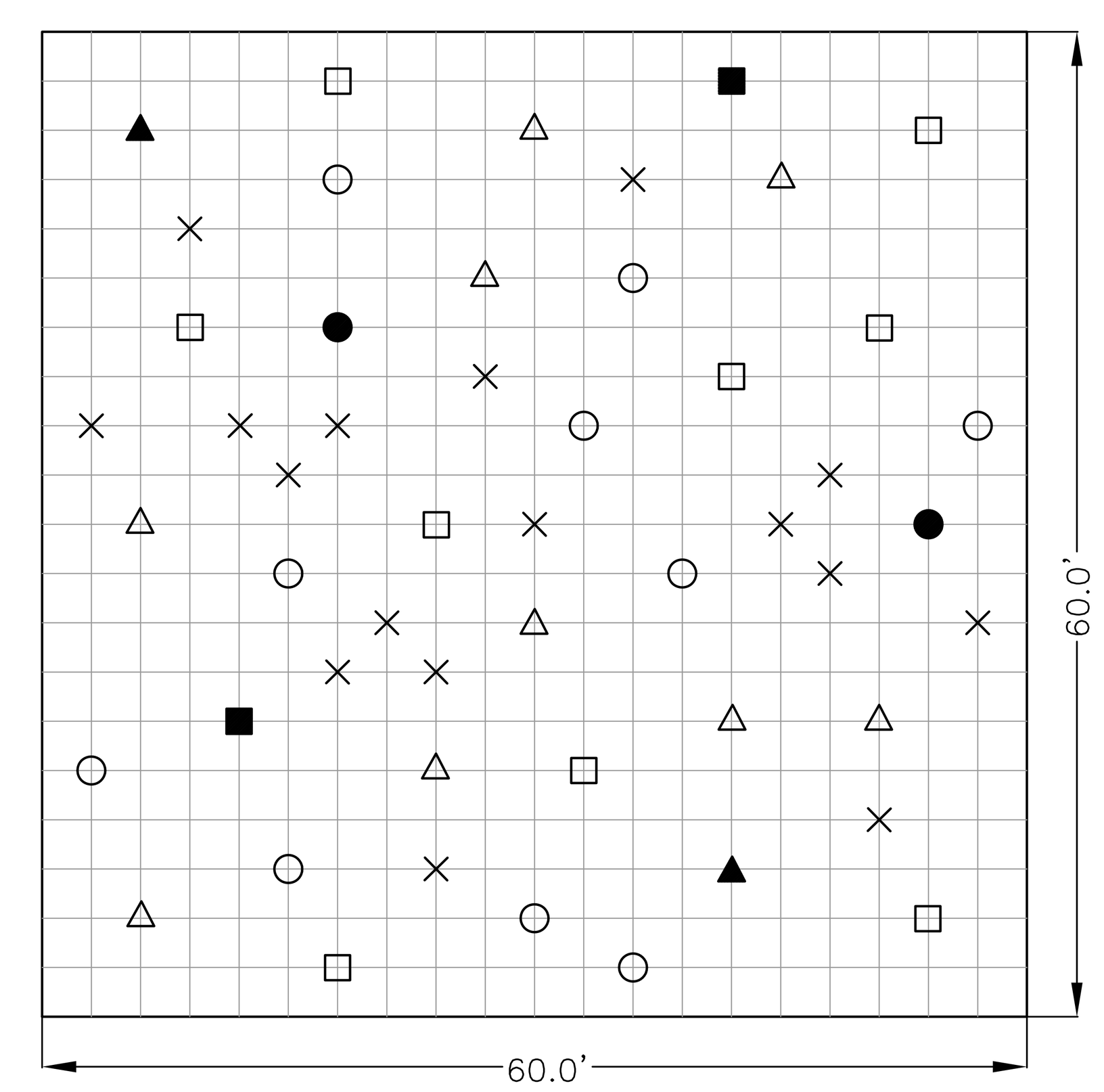
- 20 — MAJOR CONTOUR
- 18 — MINOR CONTOUR
- —X—X— FENCE
- RAILROAD TRACKS
- EXISTING WETLAND BOUNDARY
- GRAVEL
- PAVING
- FORESTED WETLAND RESTORATION: 26,100 S.F. TOTAL

NOTE:
EXISTING SITE CONDITIONS ARE SHOWN AS GREY WITH ITALICIZED TEXT. PROPOSED WORK IS SHOWN AS BLACK WITH NON–ITALICIZED TEXT.

ACRONYMS AND ABBREVIATIONS

IN. INCHES
S.F. SQUARE FEET

TYPICAL TREE SPACING DIAGRAM (3,600–SF)



1.) INTENT OF DIAGRAM IS TO ILLUSTRATE RANDOM PATTERN IN LOCATIONS OF PLANT MATERIALS
2.) MINOR VARIATIONS TO POSITIONING SHALL BE AS DIRECTED BY THE CONTRACTING OFFICER.

- ● ASH 1½"
- ○ ASH WHIP
- ■ MAPLE 1½"
- □ MAPLE WHIP
- ▲ SWEETGUM 1½"
- △ SWEETGUM WHIP
- × SHRUB

Support Area Restoration Planting Schedule

Forested Wetland (approximately 26,100 square feet)

QUANTITY	COMMON NAME	LATIN BINOMIAL	SIZE	WETLAND INDICATOR
	Trees:			
17	Green Ash	*Fraxinus pennsylvanica*	1 - 1.5 in Caliper	FACW
17	Sweetgum	*Liquidambar styraciflua*	1 - 1.5 in Caliper	FAC
17	Red Maple	*Acer rubrum*	1 - 1.5 in Caliper	FAC
64	Green Ash	*Fraxinus pennsylvanica*	whip	FACW
64	Sweetgum	*Liquidambar styraciflua*	whip	FAC
64	Red Maple	*Acer rubrum*	whip	FAC
	Shrubs:			
25	Highbush blueberry	*Vaccinium corymbosum*	2 - 3 feet	FACW
25	Arrowwood	*Viburnum recognitum*	2 - 3 feet	FACW
25	Bayberry	*Myrica pennsylvanica*	2 - 3 feet	FAC
25	Spice Bush	*Lindera benzoin*	2 - 3 feet	FACW
25	Bebb Willow	*Salix bebbiana*	2 - 3 feet	FACW
	Ground Cover:			
90	Cinnamon Fern	*Osmunda cinnonmoa*	2-in plug	FACW
90	Sensitive Fern	*Onoclea sensibilis*	2-in plug	FACW

WETLAND INDICATOR STATUS:

OBL – OBLIGATE, OBSERVED IN WETLAND > 99% OF TIME
FACW – FACULTATIVE WETLAND, OBSERVED IN WETLAND 66% – 99% OF TIME
FAC – FACULTATIVE, OBSERVED IN WETLAND 33% – 66% OF TIME
FACU – FACULTATIVE UPLAND, OBSERVED IN WETLAND 1% – 33% OF TIME
UPL– UPLAND, OBSERVED IN WETLAND < 1% OF TIME

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER NO. 24GE04395200

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Designed by: D. DUNK | Dwn by: N. WATKINS | Ckd by: T. MATHEW | Reviewed by: M. POPPER | Submitted by: K. TAN
Date: AUGUST 2014 | ANSIF | Task Order: 010 | Contract no.: W912DQ-11-D-3004 | Plot date: 8/1/2014 | Plot by: Gallerie, Ellen | Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

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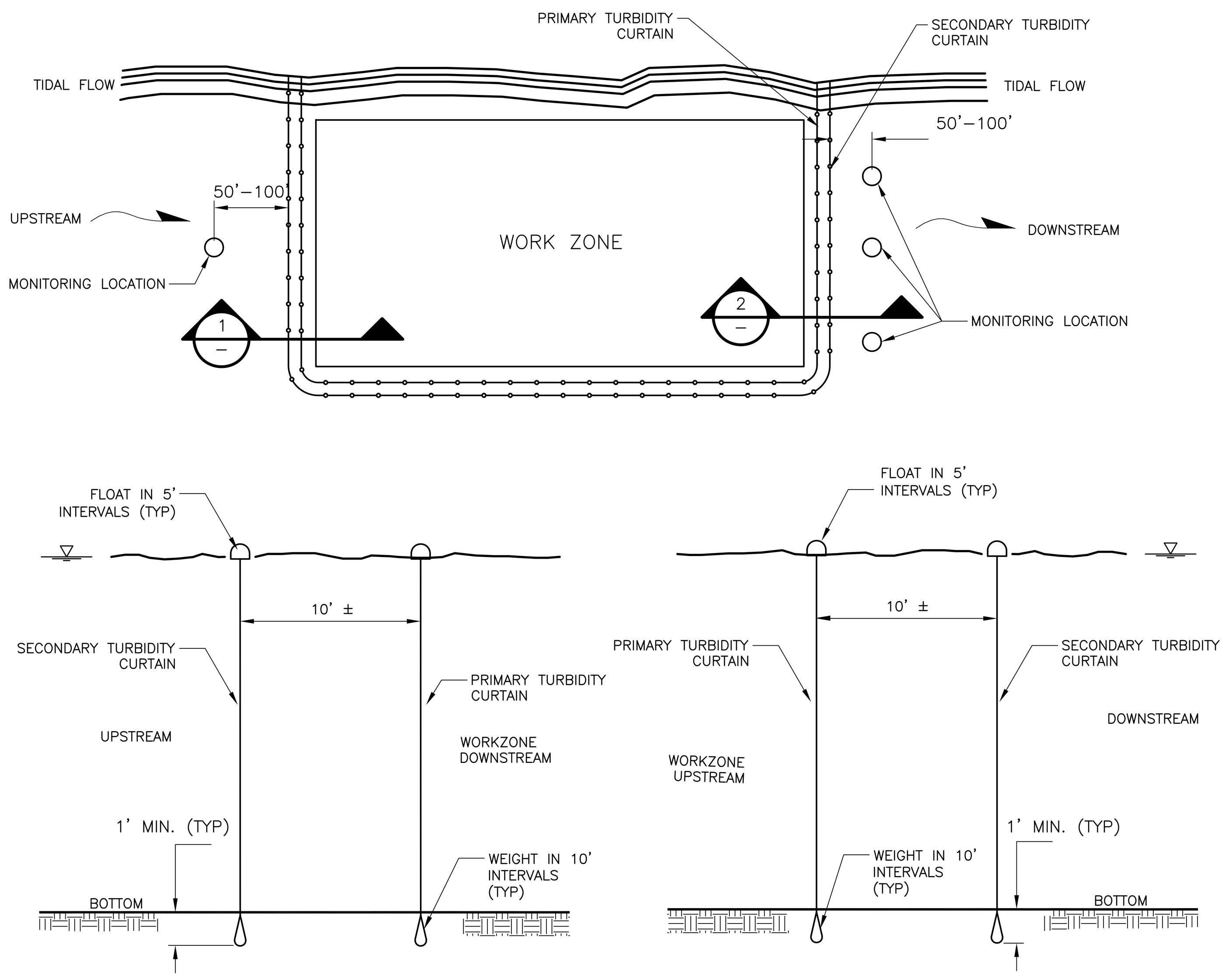
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

SUPPORT AREA
WETLAND RESTORATION PLAN

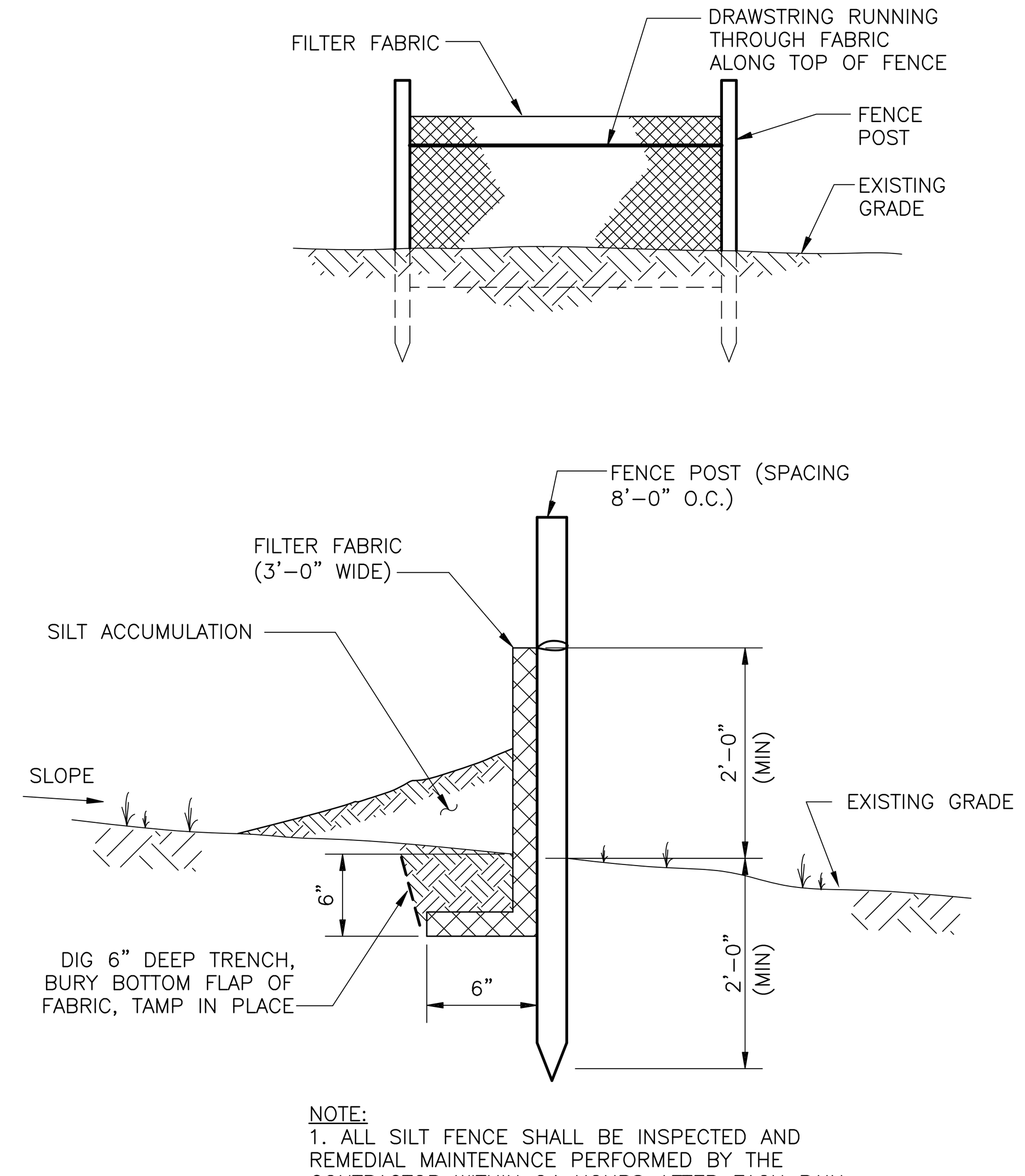
SHEET NO.
C-13

100% DESIGN



TURBIDITY BARRIER

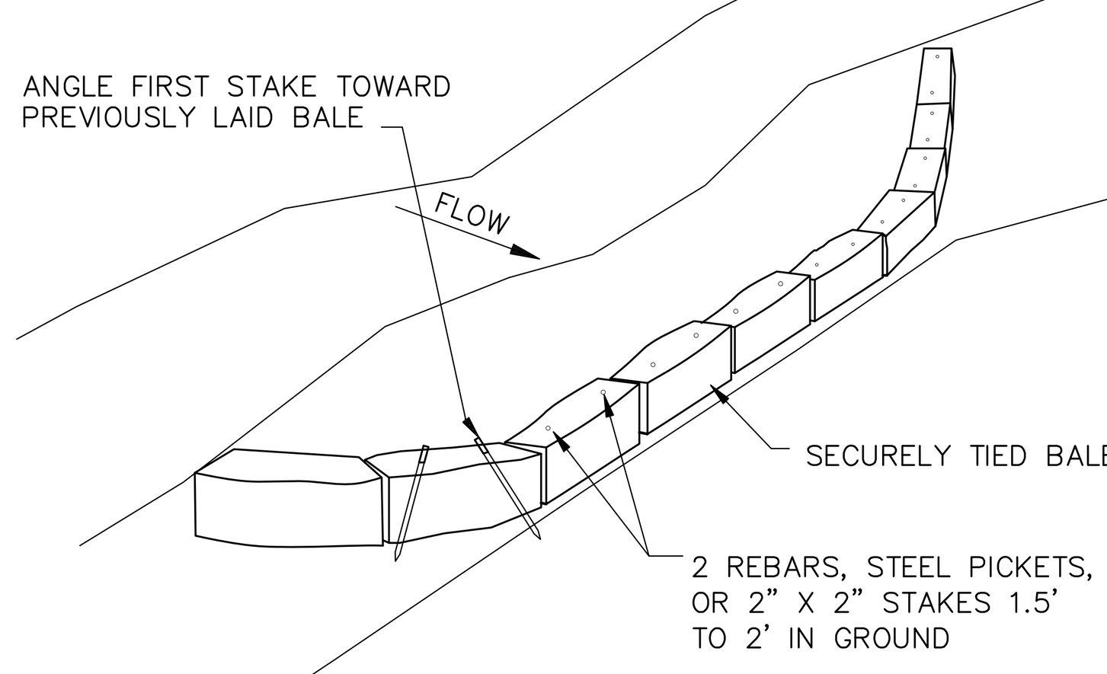
DETAIL A –
NTS



NOTE:
1. ALL SILT FENCE SHALL BE INSPECTED AND REMEDIAL MAINTENANCE PERFORMED BY THE CONTRACTOR WITHIN 24 HOURS AFTER EACH RAIN.

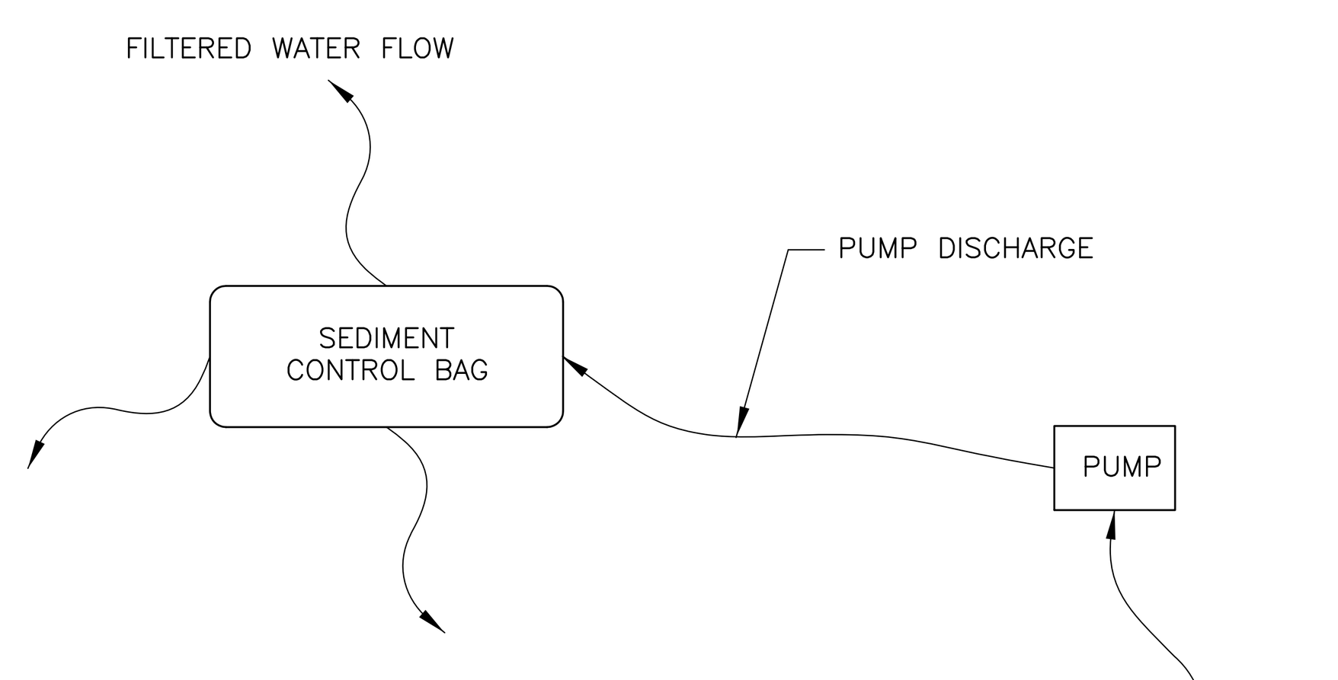
SILTATION CONTROL BARRIER DETAIL (SILT FENCE)

DETAIL B C–4
NTS



DIVERSION DETAIL

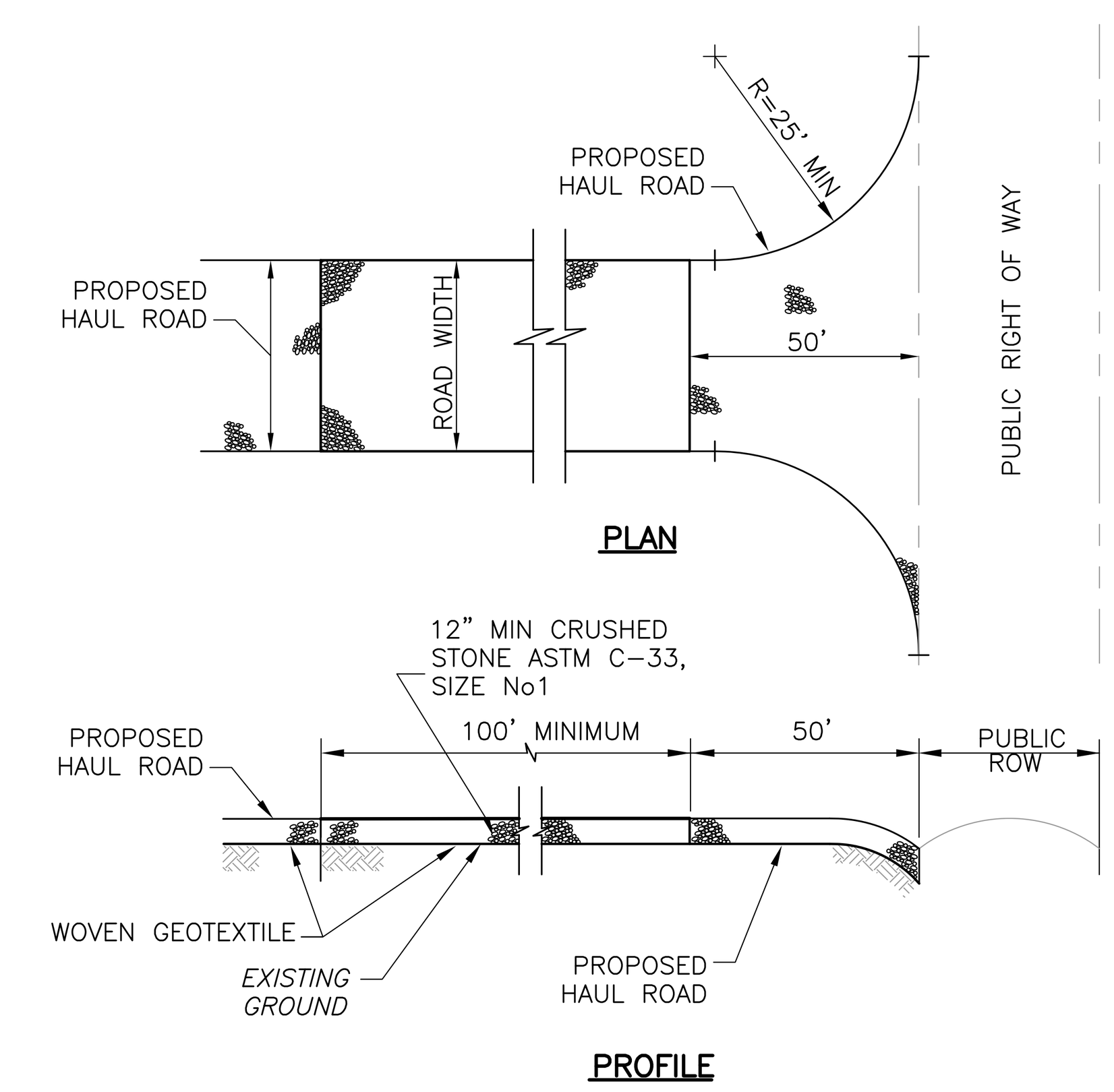
DETAIL C C–4
NTS



NOTES:
1. LOCATION OF DISCHARGE WATER SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR AS APPROVED BY THE GOVERMENT.
2. BAGS MUST BE DISPOSED OF ACCORDING TO MANUFACTURER'S INSTRUCTIONS. BAGS MAY NOT BE REUSED.
3. THIS DETAIL IS ONLY APPLICABLE TO DISCHARGE OF UNCONTAMINATED WATER INITIALLY PUMPED FROM WITHIN THE TEMPORARY BARRIER INSTALLED ALONG THE RIVER/MARSH BOUNDARY. ALL OTHER WATER GENERATED DURING DEWATERING OR THAT COMES INTO CONTACT WITH CONTAMINATED SEDIMENT SHALL BE TREATED BY THE TREATMENT SYSTEM.

SEDIMENT CONTROL BAG FOR DEWATERING

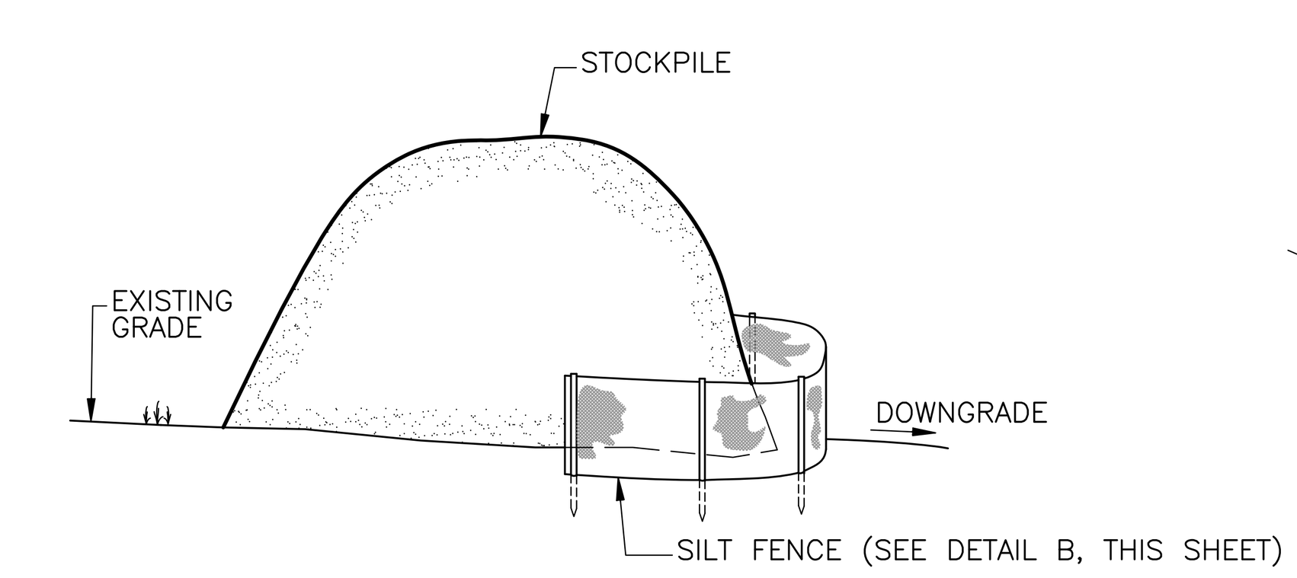
DETAIL D –
NTS



NOTES:
1. PROVIDE APPROPRIATE TRANSITION BETWEEN STABILIZED CONSTRUCTION ENTRANCE AND PUBLIC RIGHT–OF–WAY.
2. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAY THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE OR ADDITIONAL LENGTH AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC RIGHT–OF–WAY MUST BE REMOVED IMMEDIATELY

STABILIZED CONSTRUCTION ACCESS

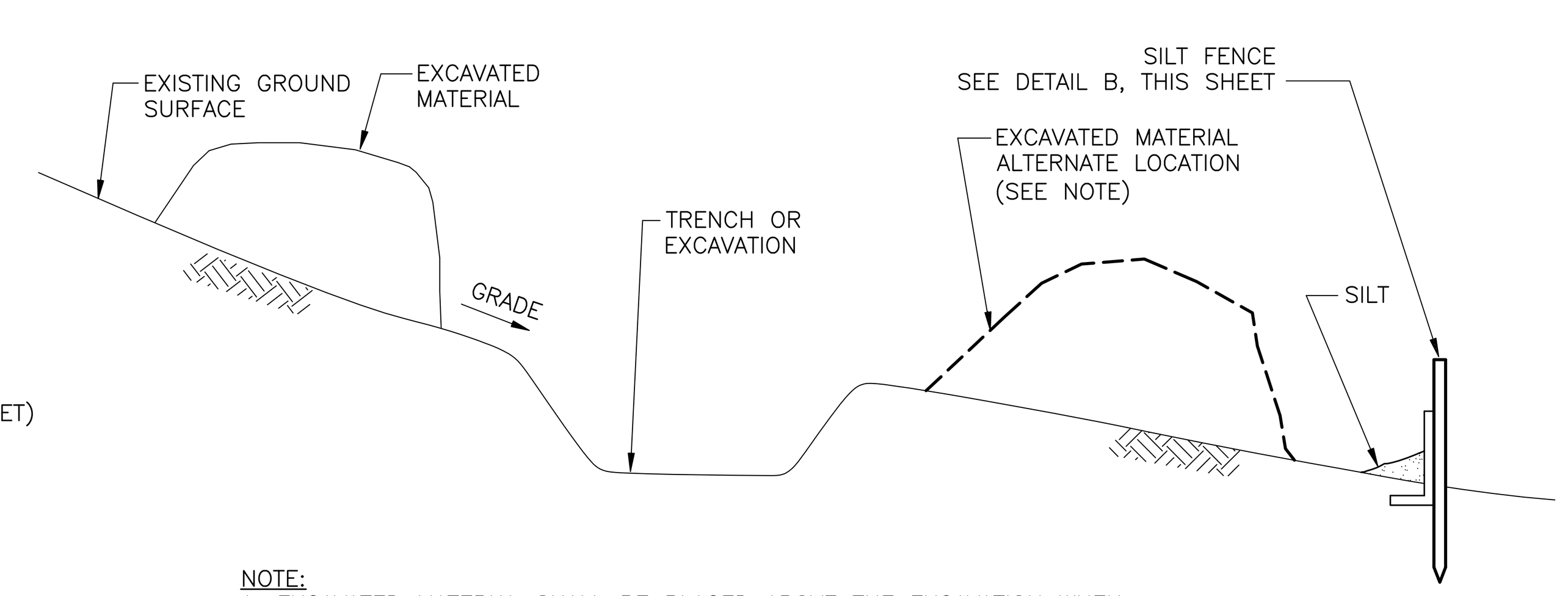
DETAIL E C–4
NTS



NOTE:
1. FOR IMPORTED FILL ONLY. NOT APPLICABLE TO EXCAVATED AND DREDGED SEDIMENTS, WHICH SHALL BE PLACED IN THE SEIDMENT CONTAINMENT AREA

TEMPORARY SOIL STOCKPILE

DETAIL F –
NTS



NOTE:
1. EXCAVATED MATERIAL SHALL BE PLACED ABOVE THE EXCAVATION WHEN CONDITIONS PERMIT. WHEN THE CONDITIONS WARRANT, AND AS DIRECTED BY THE GOVERNMENT, EXCAVATED MATERIAL SHALL BE PLACED IN THE ALTERNATE LOCATION AS SHOWN.

TRENCH PROTECTION

DETAIL G –
NTS

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. THE FREEHOLD SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED SEVENTY–TWO (72) HOURS IN ADVANCE OF ANY LAND DISTURBING ACTIVITY.
2. ALL WORK IS TO BE DONE IN ACCORDANCE WITH STATE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY.
3. ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
4. ANY CHANGES TO THE DISTRICT–CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS WILL REQUIRE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT FOR RE–CERTIFICATION. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
5. N.J.S.A. 4:24–39 ET. SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THE PROVISIONS OF THE CERTIFIED PLAN FOR SOIL EROSION HAVE BEEN COMPLIED WITH FOR PERMANENT MEASURES. ALL SITE WORK AND ALL WORK AROUND INDIVIDUAL LOTS OF SUBDIVISIONS, SHALL BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
6. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN THIRTY (30) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE TEMPORARY SEEDING, WITH THE EXCEPTION OF DREDGED MATERIAL PLACED WITHIN THE SEDIMENT CONTAINMENT AREA. IF THE SEASON PREVENTS ESTABLISHMENT OF TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF 2 TO 2 ½ TONS PER ACRE, ACCORDING TO STATE STANDARD FOR STABILIZATION WITH MULCH ONLY.
7. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF 1 ½ TO 2 TONS PER ACRE, ACCORDING TO STATE STANDARDS.
8. A SUB–BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS, AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB–BASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
9. ANY STEEP SLOPES (I.E. SLOPES GREATER THAN 1:3) RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION CONTINUES.
10. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A PAD OF CLEAN CRUSHED STONE AT POINTS WHERE TRAFFIC WILL BE ACCESSING THE CONSTRUCTION SITE. AFTER INTERIOR ROADWAYS ARE PAVED, INDIVIDUAL LOTS REQUIRE A STABILIZED CONSTRUCTION ENTRANCE CONSISTING OF ONE INCH TO TWO INCH (1" – 2") STONE FOR A MINIMAL LENGTH OF TEN FEET (10') EQUAL TO THE LOT ENTRANCE WIDTH. ALL OTHER ACCESS POINTS SHALL BE BLOCKED OFF.
11. ALL SOIL WASHED, DROPPED, SPILLED, OR TRACKED OUTSIDE THE LIMIT OF DISTURBANCE OR ONTO PUBLIC RIGHT–OF–WAYS WILL BE REMOVED IMMEDIATELY.
12. PERMANENT VEGETATION IS TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING.
13. AT THE TIME THAT SITE PREPARATION FOR PERMANENT VEGETATION STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS, AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON–VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION SHALL BE EMPLOYED.
14. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A pH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERED WITH A MINIMUM OF TWELVE (12) INCHES OF SOIL HAVING A pH OF 5 OR MORE PRIOR TO SEEDBED PREPARATION. AREAS WHERE TREES OR SHRUBS ARE TO BE PLANTED SHALL BE COVERED WITH A MINIMUM OF TWENTY–FOUR (24) INCHES OF SOIL HAVING A pH OF 5 OR MORE.
15. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
16. UNFILTERED DEWATERING IS NOT PERMITTED. NECESSARY PRECAUTIONS MUST BE TAKEN DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH THE STANDARD FOR DEWATERING. ALL WATER GENERATED THAT COMES INTO CONTACT WITH CONTAMINATED SEDIMENT SHALL BE TREATED BY THE WATER TREATMENT SYSTEM. ONLY UNCONTAMINATED WATER INITIALLY PUMPED FROM WITHIN THE TEMPORARY BARRIER PLACED AT THE MARSH/RIVER BOUNDARY MAY BE DISCHARGED WITHOUT TREATMENT. THIS WATER SHALL BE FILTERED IN ACCORDANCE WITH DETAIL D ON THIS SHEET PRIOR TO DISCHARGE.
17. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET, TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED AS REQUIRED BY THE STANDARD FOR DUST CONTROL.
18. STOCKPILE AND STAGING LOCATIONS ESTABLISHED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMITS OF DISTURBANCE WILL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. CERTIFICATION OF A NEW SOIL EROSION AND SEDIMENT CONTROL PLAN MAY BE REQUIRED FOR THESE ACTIVITIES IF AN AREA GREATER THAN 5,000 SQUARE FEET IS DISTURBED.
19. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #6.
20. THE PROPERTY OWNER SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR BELOW STORMWATER OUTFALLS OR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.

GENERAL SEQUENCE OF CONSTRUCTION

THE FOLLOWING IS A BASIC OUTLINE OF THE GENERAL SEQUENCE OF CONSTRUCTION FOR THE PROJECT:
1. INSTALL FIELD OFFICES AS NECESSARY.
2. ESTABLISH LIMITS OF WORK, INSTALL SILTATION CONTROL BARRIERS.
3. PERFORM CLEARING, GRUBBING AND DEBRIS REMOVAL AS NECESSARY.
4. CONSTRUCT HAUL ROADS, SEDIMENT CONTAINMENT AREA, LOADOUT AREA, RAIL SPUR, TEMPORARY TREATMENT SYSTEM, AND STORMWATER DIVERSION CHANNELS AND PIPES PRIOR TO ANY EXCAVATION/DREDGING.
5. PERFORM TEMPORARY SOIL STABILIZATION AND MAINTENANCE ON ALL SOIL EROSION AND SEDIMENT CONTROL DEVICES.
6. PERFORM DREDGING/EXCAVATION WORK IN STAGES PER RECOMMENDATIONS INDICATED IN SHEET C–2.
7. PERFORM SITE RESTORATION ACTIVITIES INCLUDING WETLANDS RESTORATION AND REMOVAL OF THE SEDIMENT CONTAINMENT AREA, LOADOUT AREA, RAIL SPUR, TEMPORARY TREATMENT SYSTEM, AND TEMPORARY STORMWATER DIVERSION CHANNELS.
8. REMOVE ALL CONSTRUCTION DEBRIS, TEMPORARY FACILITIES, AND SOIL EROSION AND SEDIMENT CONTROL DEVICES.
9. INSTALL PLANTINGS IN TRAILER COMPOUND AREA.

MATERIAL SPECIFICATIONS

A. SILT FENCE
1. STEEL POSTS SHALL BE A MINIMUM OF 5 FEET IN LENGTH, 2–1/2–IN X 2–1/2–IN X 1/4–IN ANGLE POST WITH SELF–FASTENING TABS AND A 5–IN X 4–IN (NOMINAL) STEEL ANCHOR PLATE AT BOTTOM.
2. WELDED WIRE FABRIC SHALL BE 4–IN X 4–IN MESH OF 12 GA. STEEL WIRE.
3. SILT FENCE FABRIC SHALL BE A WOVEN, POLYPROPYLENE, ULTRAVIOLET RESISTANT MATERIAL, AS PER SPECIFICATION SECTION 02273.
4. TIE WIRES FOR SECURING SILT FENCE FABRIC TO WIRE MESH SHALL BE LIGHT GAUGE METAL CLIPS (HOG RINGS), OR 1/32–IN DIAMETER SOFT ALUMINUM WIRE.

B. TEMPORARY SEEDING
TEMPORARY STABILIZATION SHALL BE PROVIDED FOR NEWLY GRADED SUBGRADE AREAS THAT CANNOT BE TOPSOILED AND SEEDED BECAUSE OF SEASON OR WEATHER CONDITIONS AND WILL REMAIN EXPOSED FOR MORE THAN 30 DAYS. THESE AREAS SHALL BE PROTECTED AGAINST EROSION AND WASHOUT AS FOLLOWS:
1. APPLY LIMESTONE — 1 TON PER ACRE
2. APPLY FERTILIZER (10–20–10) — 500 LBS PER ACRE
3. WORK LIME AND FERTILIZER INTO THE GROUND
4. APPLY SEED MIX, THE SEED MIXTURE SHALL CONSIST OF SEED PROPORTIONED BY WEIGHT IN LBS PER ACRE AS FOLLOWS:

PERENNIAL RYE GRASS	100
SPRING OATS	86
WINTER BARLEY	96
WINTER CEREAL RYE	112

5. APPLY FIBER MULCH — 45 LBS PER 1,000 SQ. FT.

C. TEMPORARY STABILIZATION WITH MULCH ONLY
STRAW MULCH OR EQUIVALENT SPREAD UNIFORMLY AT THE RATE OF 90–110 LBS PER 1,000 SQ. FT. (TOTAL GROUND SURFACE COVERAGE). THIS PRACTICE IS APPLICABLE IN AREAS WHERE THE SEASON OR OTHER CONDITIONS MAY NOT BE SUITABLE FOR ESTABLISHING VEGETATION COVER. MULCH ONLY IS TO BE USED ONLY FOR SHORT PERIODS AND WILL REQUIRE MAINTENANCE AND REAPPLICATION.

D. PERMANENT SEEDING
SEEDING, MULCHING AND CONDITIONING SHALL ONLY BE PERFORMED DURING THOSE PERIODS WITHIN THE SEASONS WHICH ARE NORMAL FOR SUCH WORK. THE SEED MIXTURE SPECIES AND WEIGHTS SHALL BE IN ACCORDANCE WITH SPECIFICATION SECTIONS 02921 AND 02955.
TOPSOIL SHALL BE PLACED TO A MINIMUM COMPACTED DEPTH OF 6–IN IN ALL DISTURBED AREAS NOT COVERED WITH STRUCTURES, PAVEMENT, OR GRAVEL SURFACES, UNLESS OTHERWISE SPECIFIED.

FOR ALL AREAS TO BE SEEDED:
1. LIME SHALL BE APPLIED AT THE RATE OF 3.3 TONS PER ACRE OR AS DETERMINED BY THE SOIL TEST TO BRING TOPSOIL pH TO A RANGE OF 6.0 TO 7.0.
2. FERTILIZER (10–20–10) SHALL BE APPLIED AT THE RATE OF 1,300 LBS. PER ACRE.
3. FIBER MULCH SHALL BE APPLIED AT THE RATE OF 45 LBS. PER 1,000 SQ. FT. IF POSSIBLE, LIMESTONE SHALL BE APPLIED TWO TO THREE MONTHS BEFORE THE APPLICATION OF FERTILIZER. LIMESTONE MAY NOT BE MIXED WITH FERTILIZER FOR APPLICATION AND SHALL BE APPLIED A MINIMUM OF TWO WEEKS PRIOR TO FERTILIZER APPLICATION. AFTER THE TOPSOIL IS PLACED AND BEFORE IT IS RAKED TO TRUE LINES AND ROLLED, LIMESTONE SHALL BE SPREAD EVENLY OVER THE LOAM SURFACE AND THOROUGHLY INCORPORATED BY HEAVY RAKING TO AT LEAST ONE HALF THE DEPTH OF TOPSOIL. THE APPLICATION OF FERTILIZER MAY BE PERFORMED HYDRAULICALLY IN ONE OPERATION WITH HYDROSEEDING. MULCH SHALL BE APPLIED HYDRAULICALLY IN A SEPARATE OPERATION. MANUAL SEEDING SHALL BE PERFORMED IN AREAS ADJACENT TO STRUCTURES AND IN CONFINED AREAS WHERE HYDROSEEDING IS IMPRACTICAL.

ACRONYMS AND ABBREVIATIONS

ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
IN	INCH
LBS	POUNDS
MIN	MINIMUM
NJSA	NEW JERSEY STATUTES ANNOTATED
NTS	NOT TO SCALE
O.C.	ON CENTER
R	RADIUS
SQ.FT.	SQUARE FOOT
TYP	TYPICAL

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

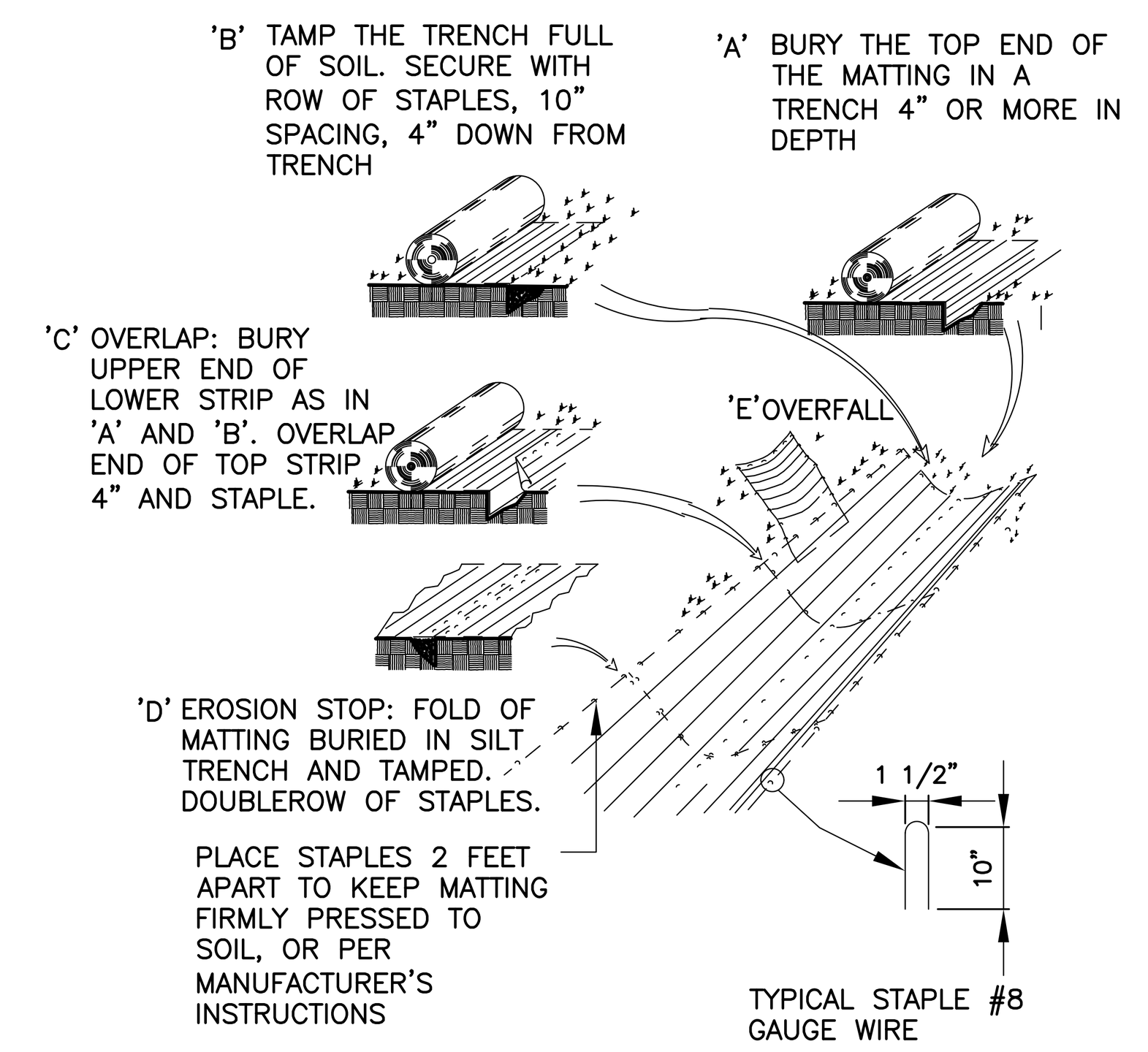
Designed by: E. GALLERIE
Dwn by: E. LARSON
Ckd by: T. MATHEW
Reviewed by: M. POPPER
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 7/31/2014
Plot by: Gallerie, Ellen
Scale: 1:1
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI
CDM Federal Programs Corporation
File name: CSEDT001.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

CIVIL DETAILS I SOIL EROSION AND SEDIMENT CONTROL

SHEET NO.
CD-1

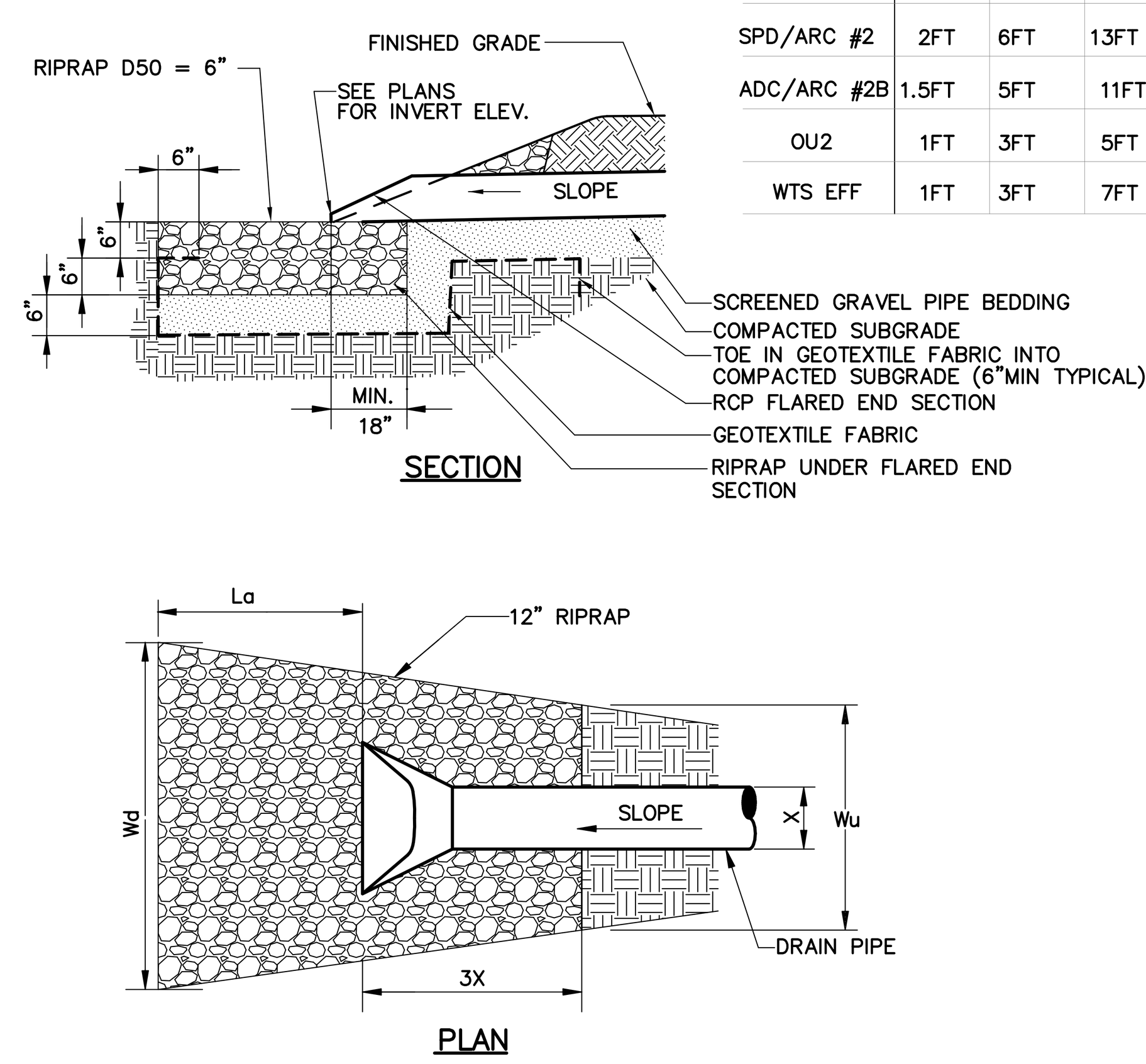
100% DESIGN



EROSION CONTROL BLANKET FOR CHANNELS

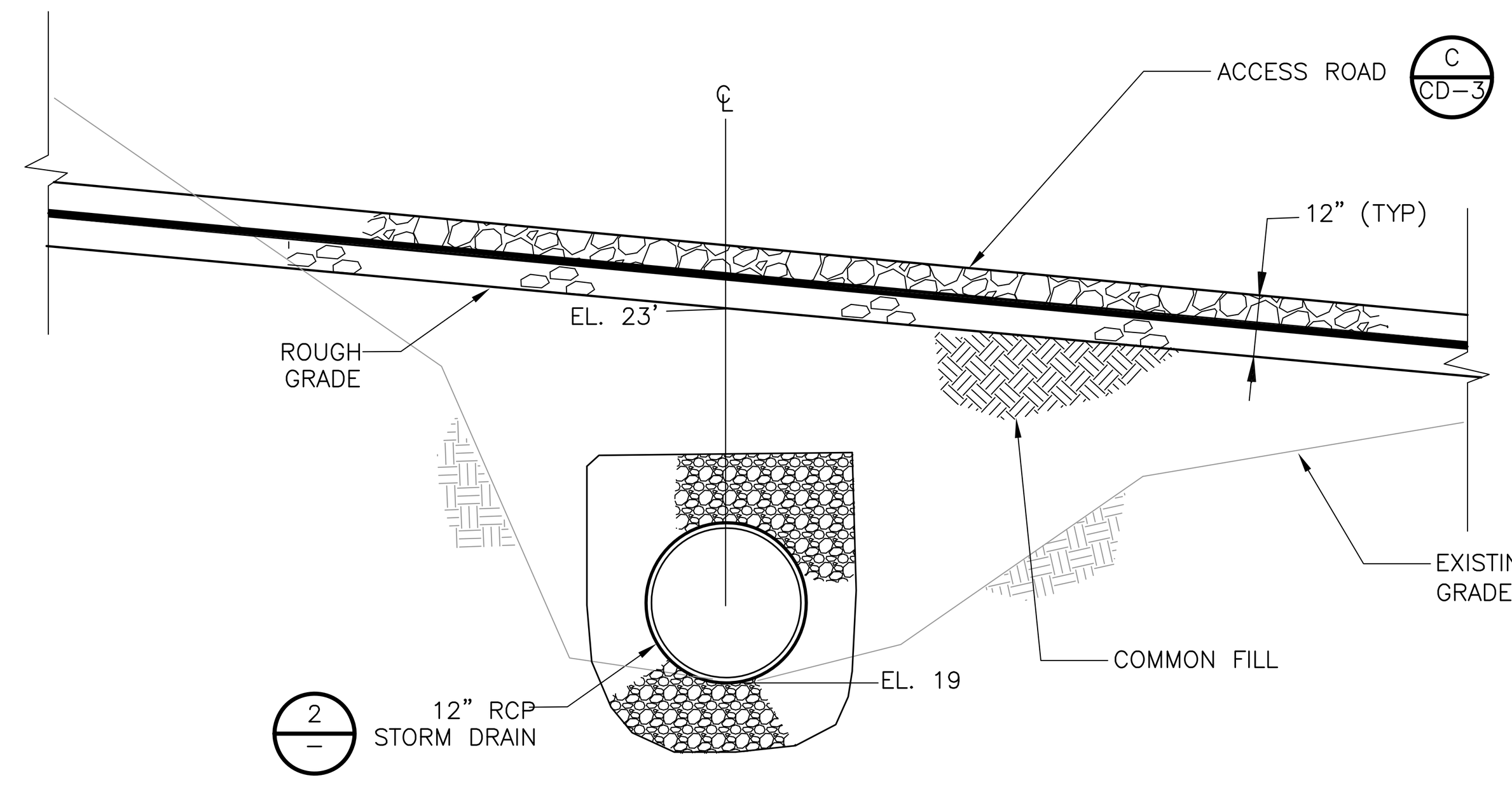
DETAIL 1 (C-3,4,12)
NTS

	X	Wu	Wd	La
SPD/ARC #1B	2FT	6FT	13FT	17FT
SPD/ARC #2	2FT	6FT	13FT	18FT
ADC/ARC #2B	1.5FT	5FT	11FT	17FT
OU2	1FT	3FT	5FT	4FT
WTS EFF	1FT	3FT	7FT	10FT



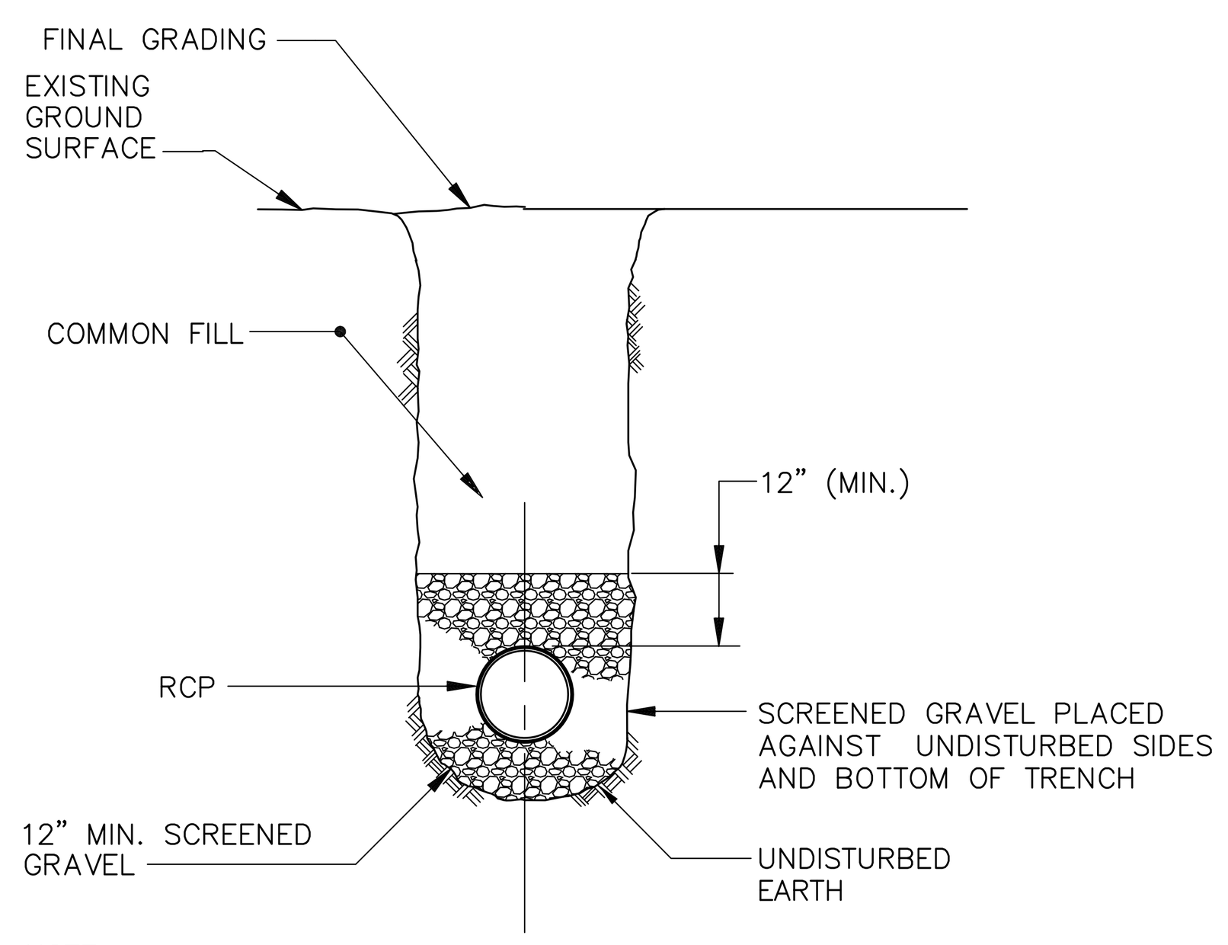
FLARED END SECTION (F.E.S.)

DETAIL 4 (C-3)
NTS



OU2 CHANNEL CROSSING – LOADOUT AREA

SECTION 1 (C-3)
NTS

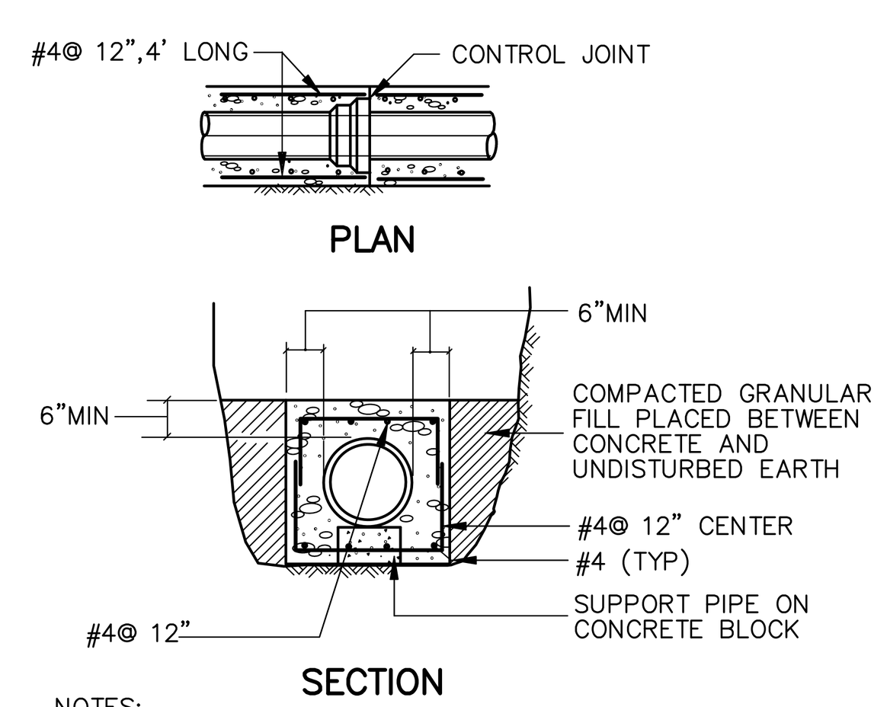


NOTE:

1. GEOTEXTILE FABRIC SHALL BE PLACED BETWEEN UNDISTURBED EARTH AND SCREENED GRAVEL WHERE TRENCH EXCAVATION EXTENDS BELOW THE GROUNDWATER LEVEL.

TYPICAL TRENCH DETAIL FOR RCP PIPE IN UNPAVED AREA

DETAIL 2 (C-3)
NTS

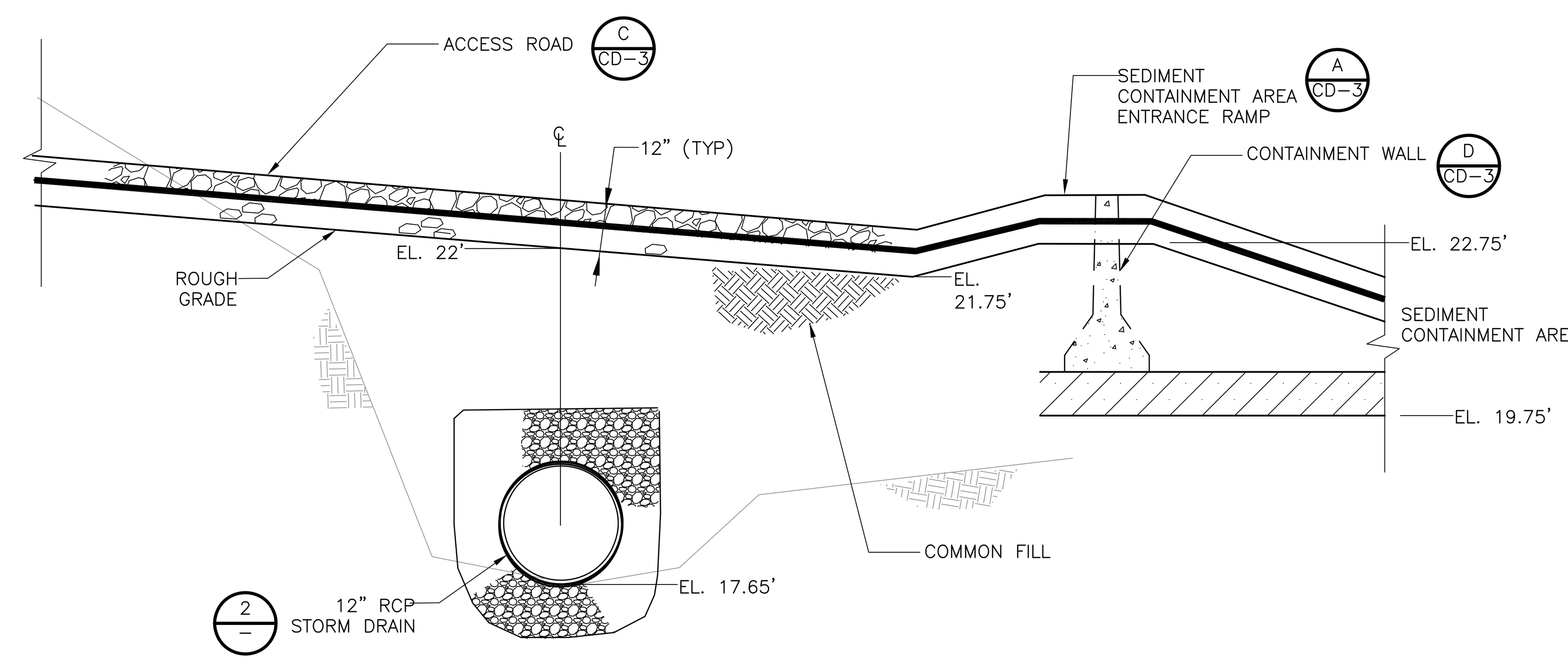


NOTES:

1. CONTROL JOINTS AND PIPE JOINTS FOR ARCHES, CRADLES AND ENCASEMENT SHALL COINCIDE FOR SPACING. MAX.DISTANCE BETWEEN CONTROL JOINTS SHALL BE 24'þ
2. REINFORCING STEEL TO BE USED ONLY WHEN DEPTH OF COVER TO TOP OF SURFACE OF CONCRETE IS 5' –0" OR LESS

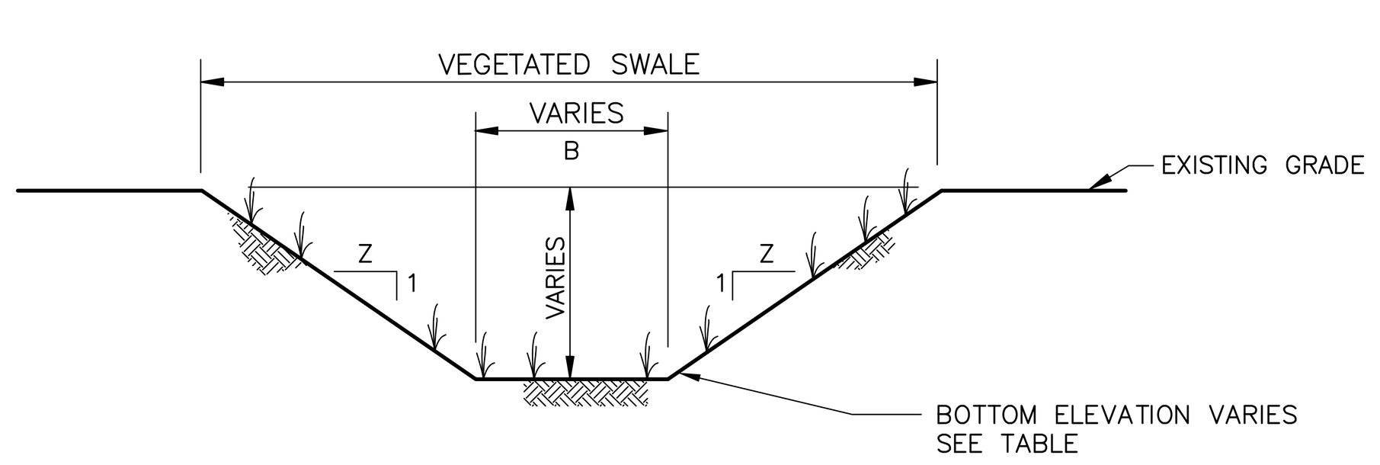
CONCRETE PIPE ENCASEMENT DETAIL

DETAIL 5 (C-3)
NTS



OU2 CHANNEL CROSSING – SEDIMENT CONTAINMENT AREA

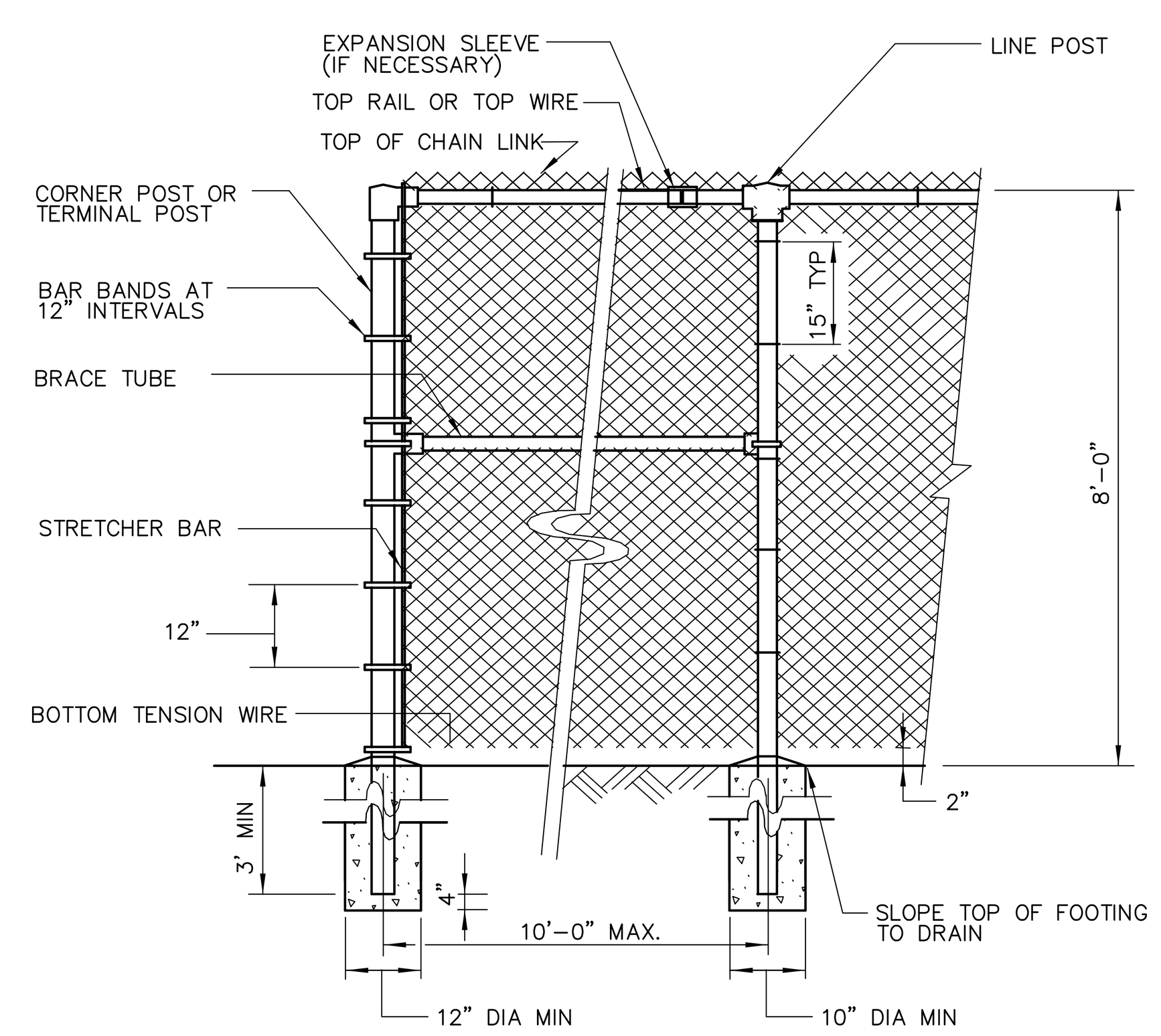
SECTION 2 (C-3)
NTS



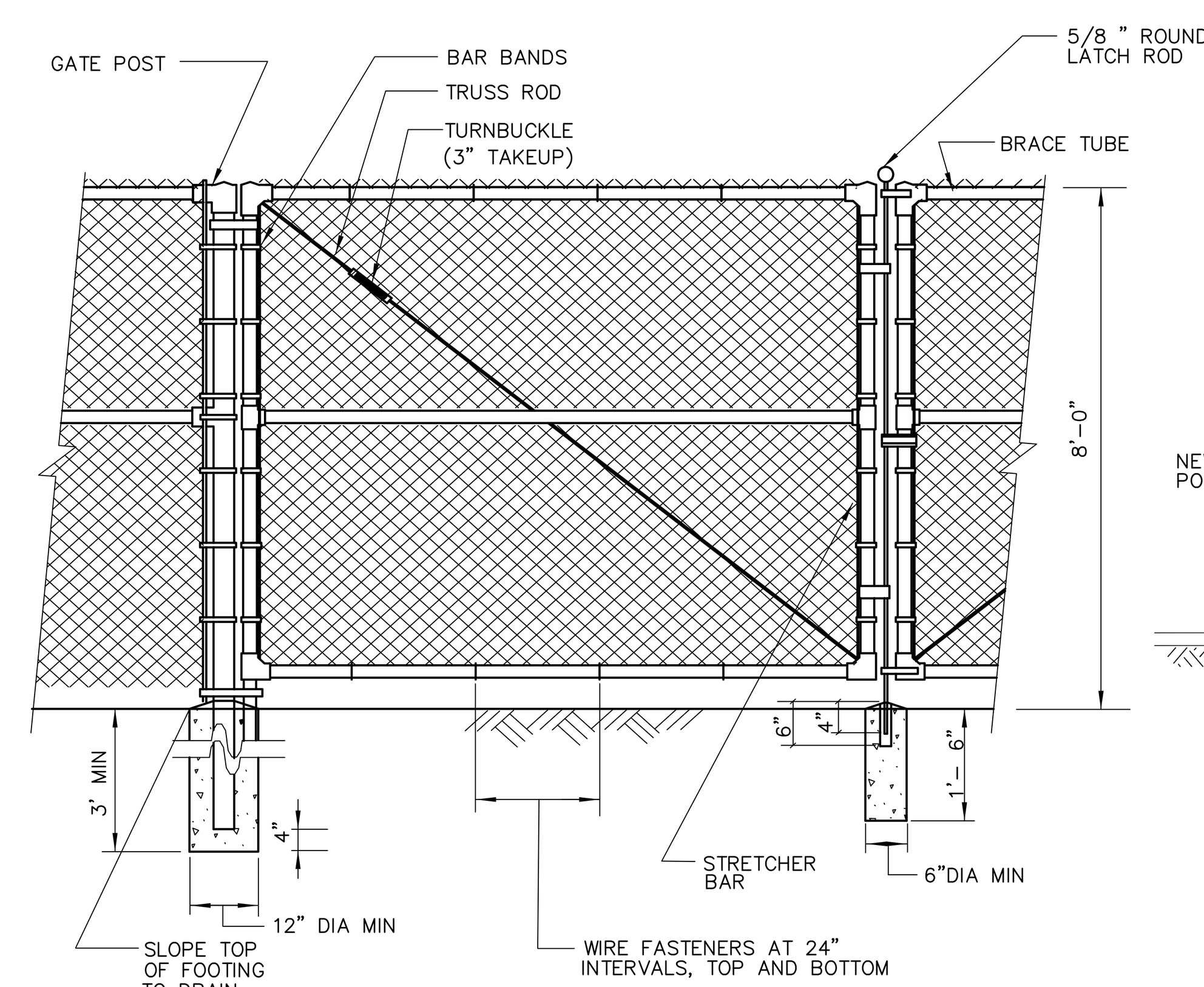
VEGETATED TEMPORARY DRAINAGE SWALE

DETAIL 3 (C-3)
NTS

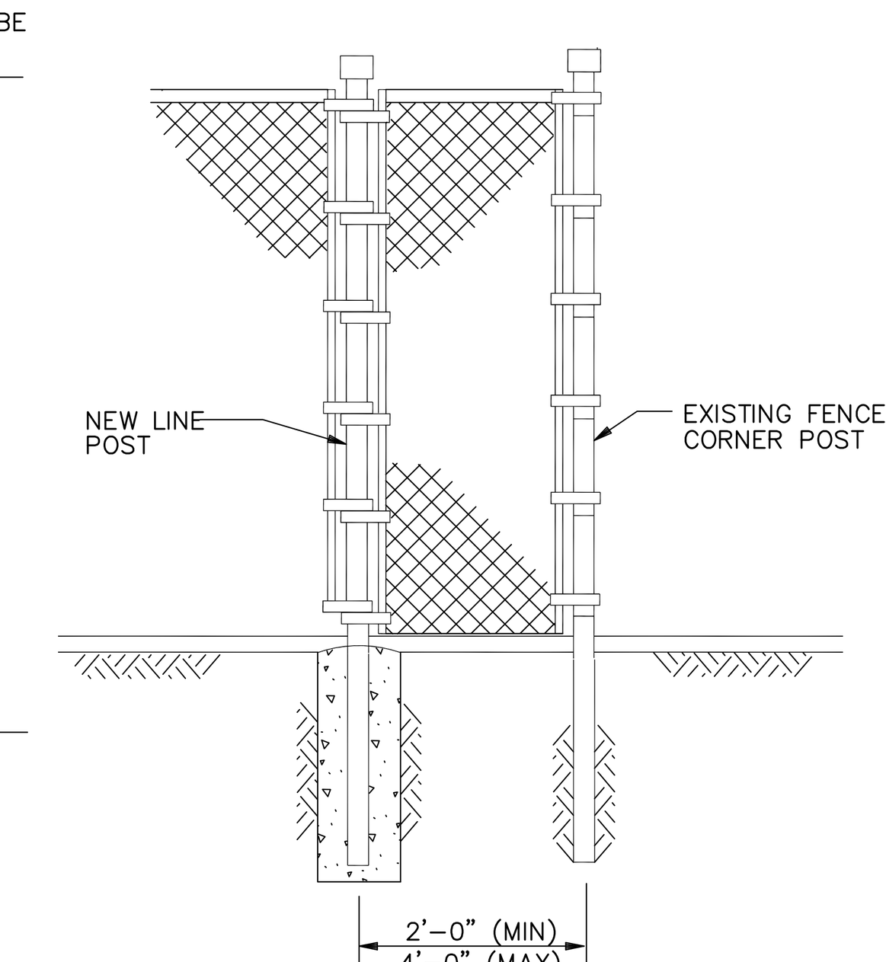
Name	Channel Characteristics				Bottom Elevation	
	Length (ft)	Slope (ft/ft)	B (ft)	z	Upstream (ft)	Downstream (ft)
SPD/ADC #1a	90	0.0096	6	4	10.36	9.50
SPD/ADC #1c	191	0.0049	4	3	9.24	8.30
SPD/ADC #3	300	0.0054	4	3	6.62	5.00
SPD/ADC #4	120	0.0375	3	3	5.00	0.50
ADC/ARC #1	352	0.0043	6	3	6.01	4.50
ADC/ARC #2a	63	0.0063	3	3	4.50	4.10
ADC/ARC #2c	100	0.0100	3	2	1.50	0.50



CHAIN LINK FENCE



CHAIN LINK FENCE GATE



FENCE CONNECTION

TYPICAL CHAIN LINK FENCE DETAIL

DETAIL 6 (C-12)
NTS

NOTES:

1. FABRIC TO BE INSTALLED ON SIDE OF THE POST TO MATCH EXISTING.
2. GATE SIZE AND LOCATION SHALL MATCH EXISTING.

ACRONYMS AND ABBREVIATIONS

ADC	ATLANTIC DEVELOPMENT CORPORATION
ARC	ATLANTIC RESOURCES CORPORATION
D	DIAMETER
DIA	DIAMETER
EFF	EFFLUENT
EL	ELEVATION
F.E.S	FLARED END SECTION
FT	FEET
L	LENGTH
MIN.	MINIMUM
MAX.	MAXIMUM
OU	OPERABLE UNIT
RCP	REINFORCED CONCRETE PIPE
SPD	SAYREVILLE PESTICIDE DUMP
TYP	TYPICAL
W	WIDTH
WTS	WATER TREATMENT SYSTEM

US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark | Date | Description | Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

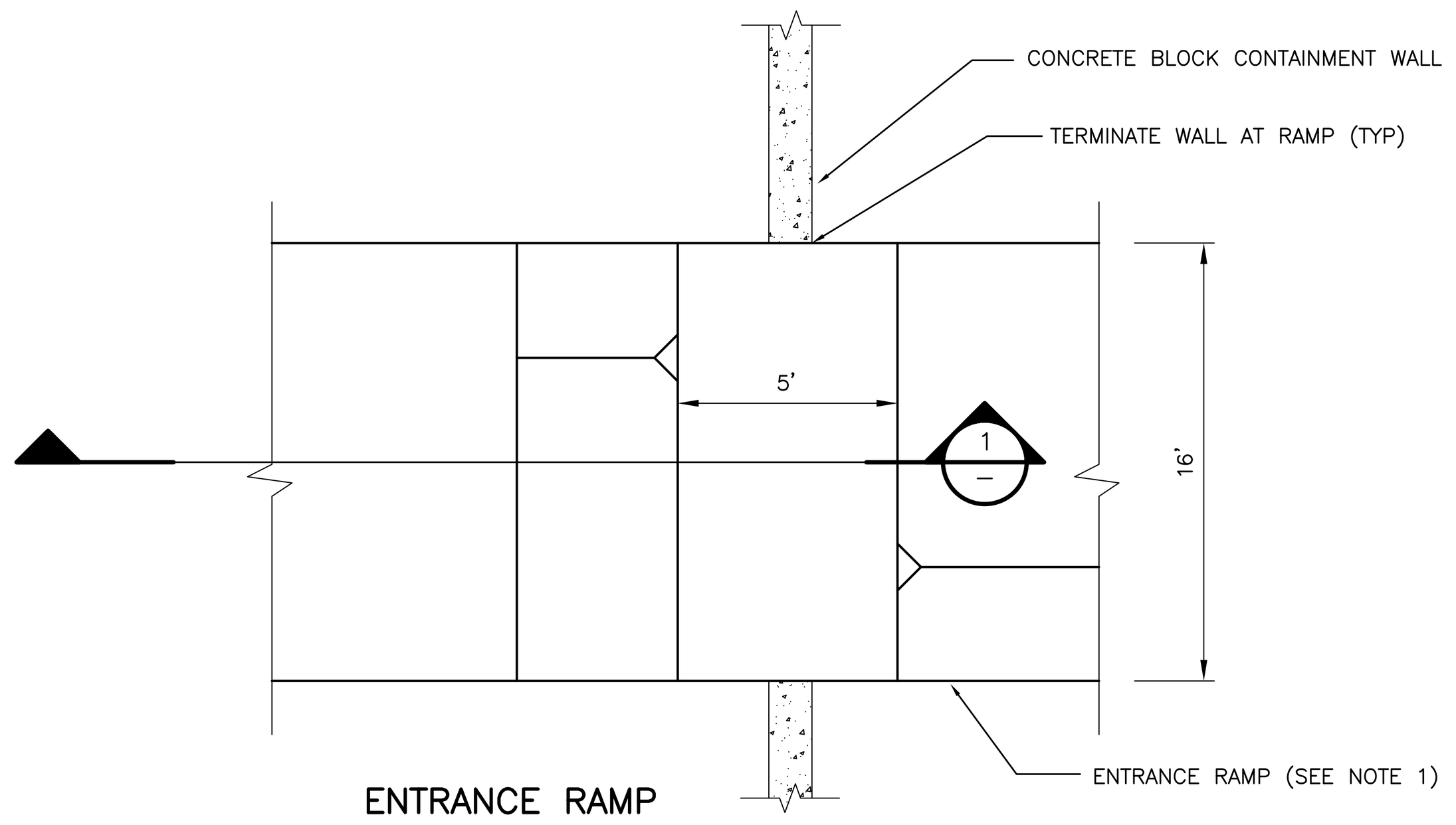
Designed by: E. GALLERIE
Dwn by: E. LARSON
Ckd by: T. MATHEW
Reviewed by: M. POPPER
Submitted by: K. TAN
Date: AUGUST 2014
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 8/1/2014
Plot by: Gallerie, Ellen
Scale: 1:1
ANSIF
File name: CSEDT002.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

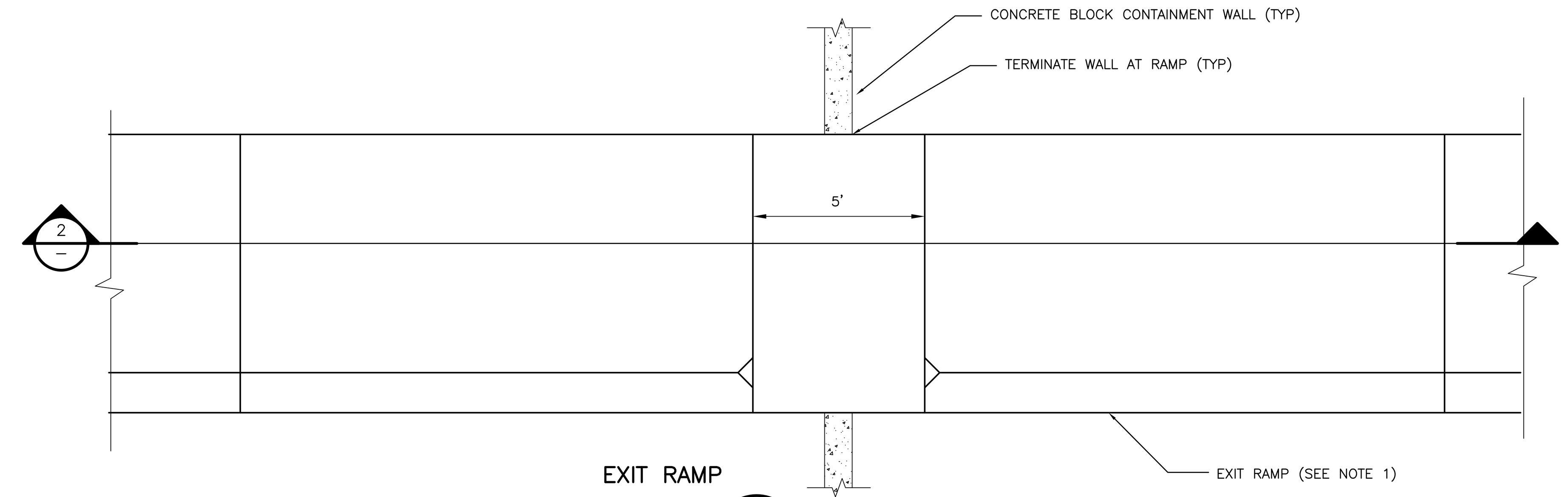
CIVIL DETAILS II
CIVIL DETAILS

SHEET NO.
CD-2

100% DESIGN



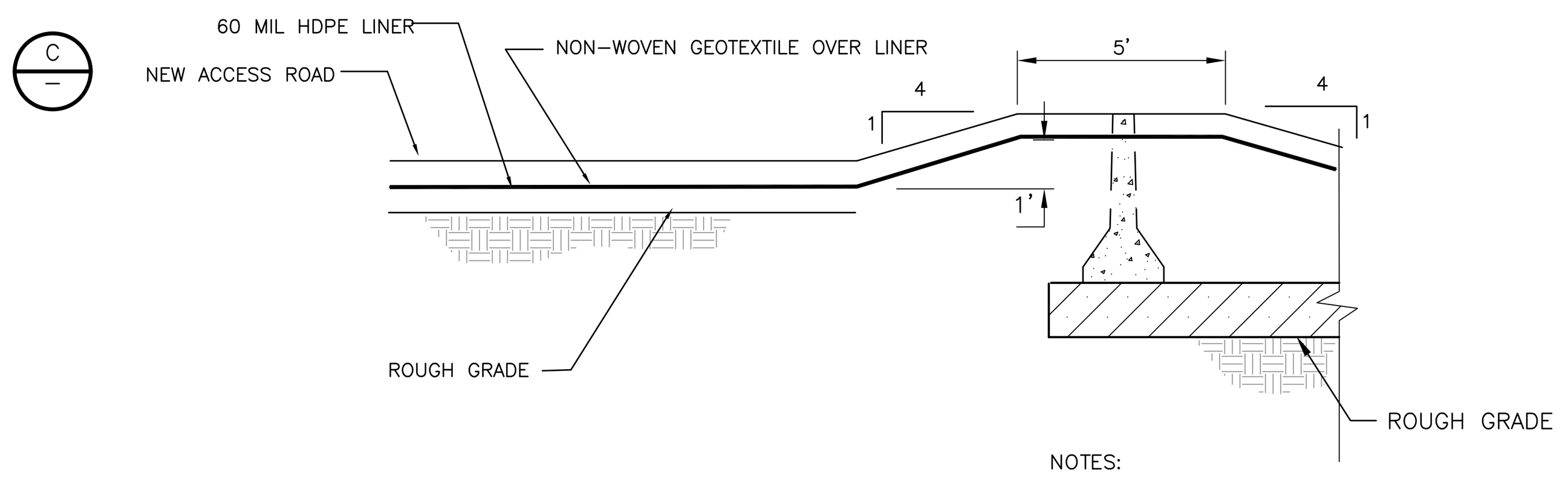
ENTRANCE RAMP
DETAIL A (C-3,5)
NTS



EXIT RAMP
DETAIL B (C-3,5)
NTS

ACRONYMS AND ABBREVIATIONS

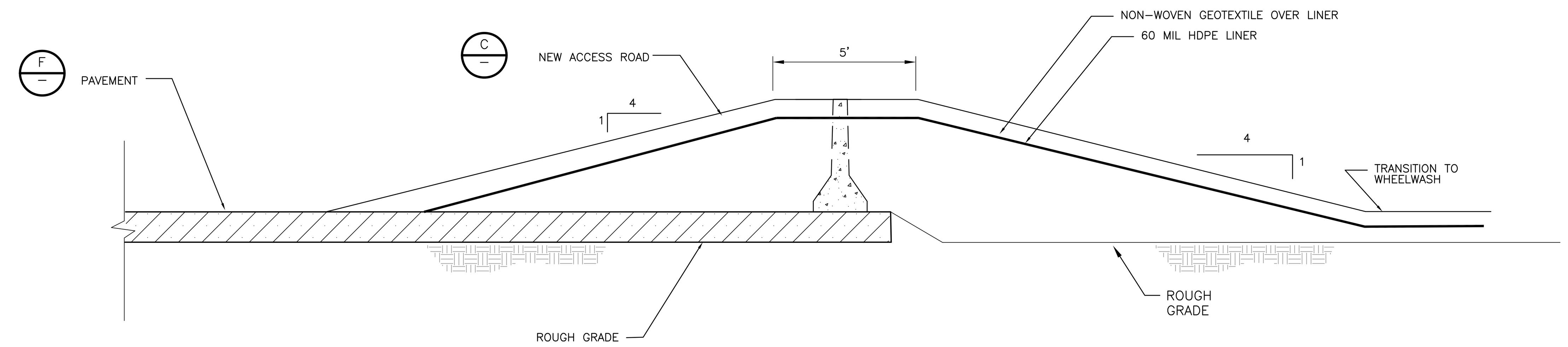
A.F.F.	ABOVE FINISHED FLOOR
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
GALV.	GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
HMA	HOT MIX ASPHALT
LBS	POUNDS
MCUA	MIDDLESEX COUNTY UTILITIES AUTHORITY
MIN	MINIMUM
O.C.	ON CENTER
TYP	TYPICAL



NOTES:

1. RAMP TO BE CONSTRUCTED OF DENSE GRADED AGGREGATE.

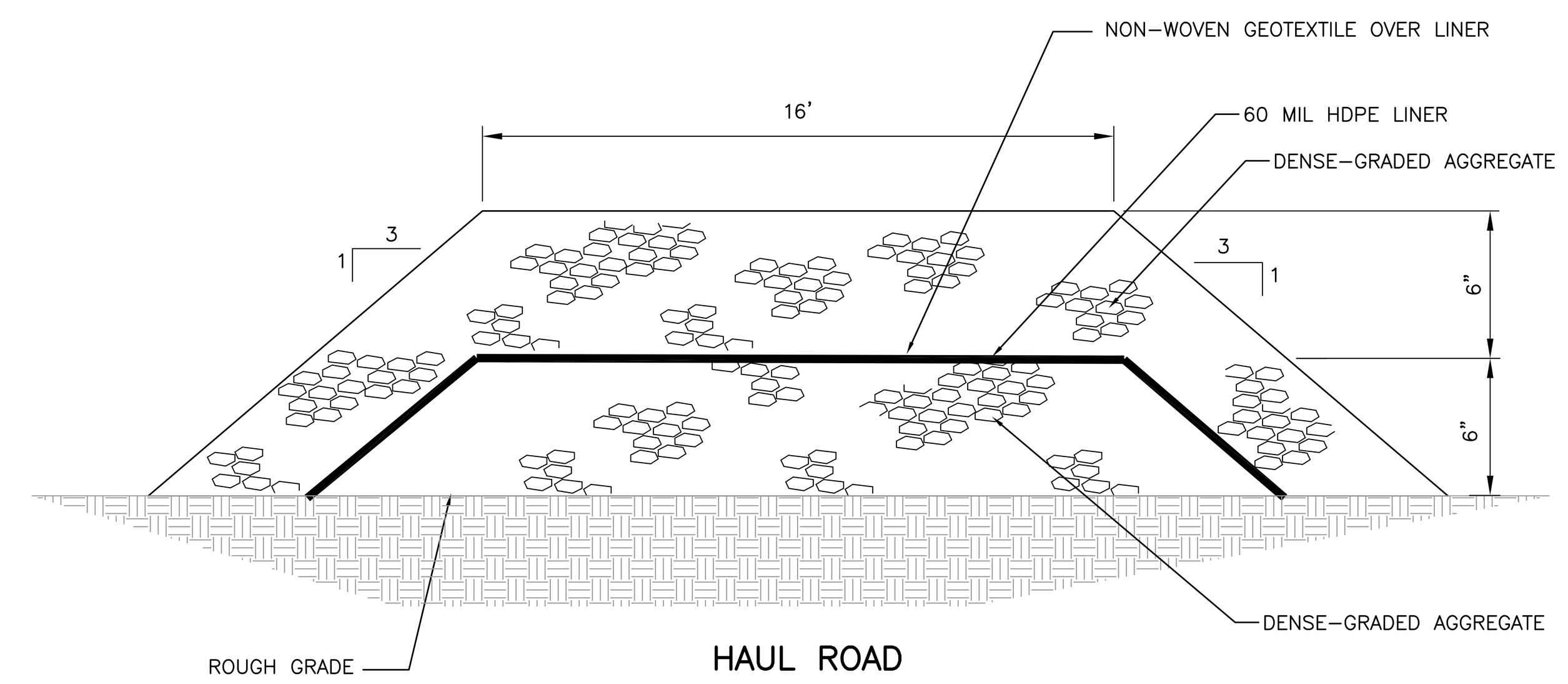
ENTRANCE RAMP
SECTION 1 (–)
NTS



EXIT RAMP
SECTION 2 (–)
NTS

NOTES:

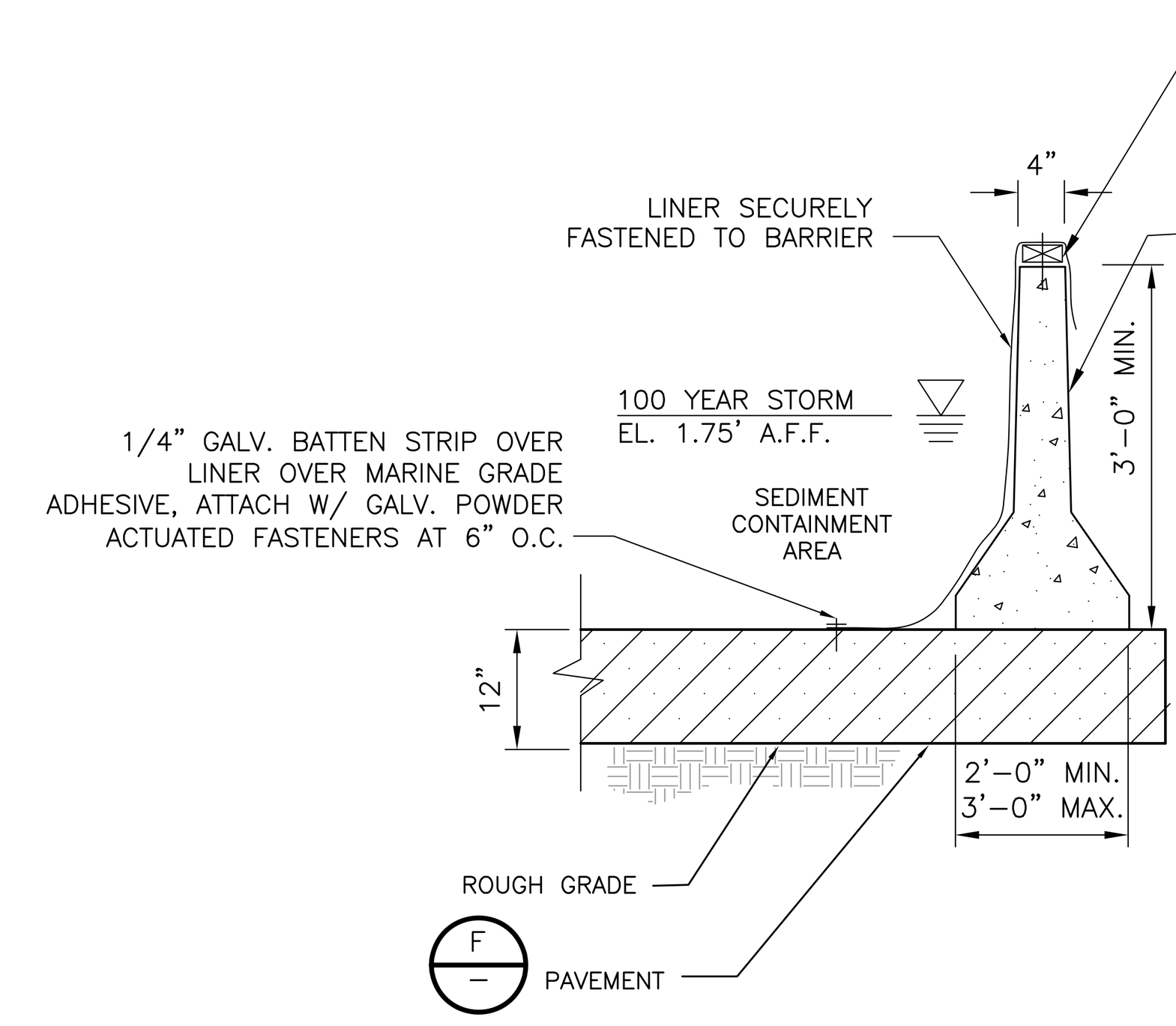
1. RAMP TO BE CONSTRUCTED OF DENSE GRADED AGGREGATE.



HAUL ROAD
DETAIL C (C-3,5)
NTS

NOTES:

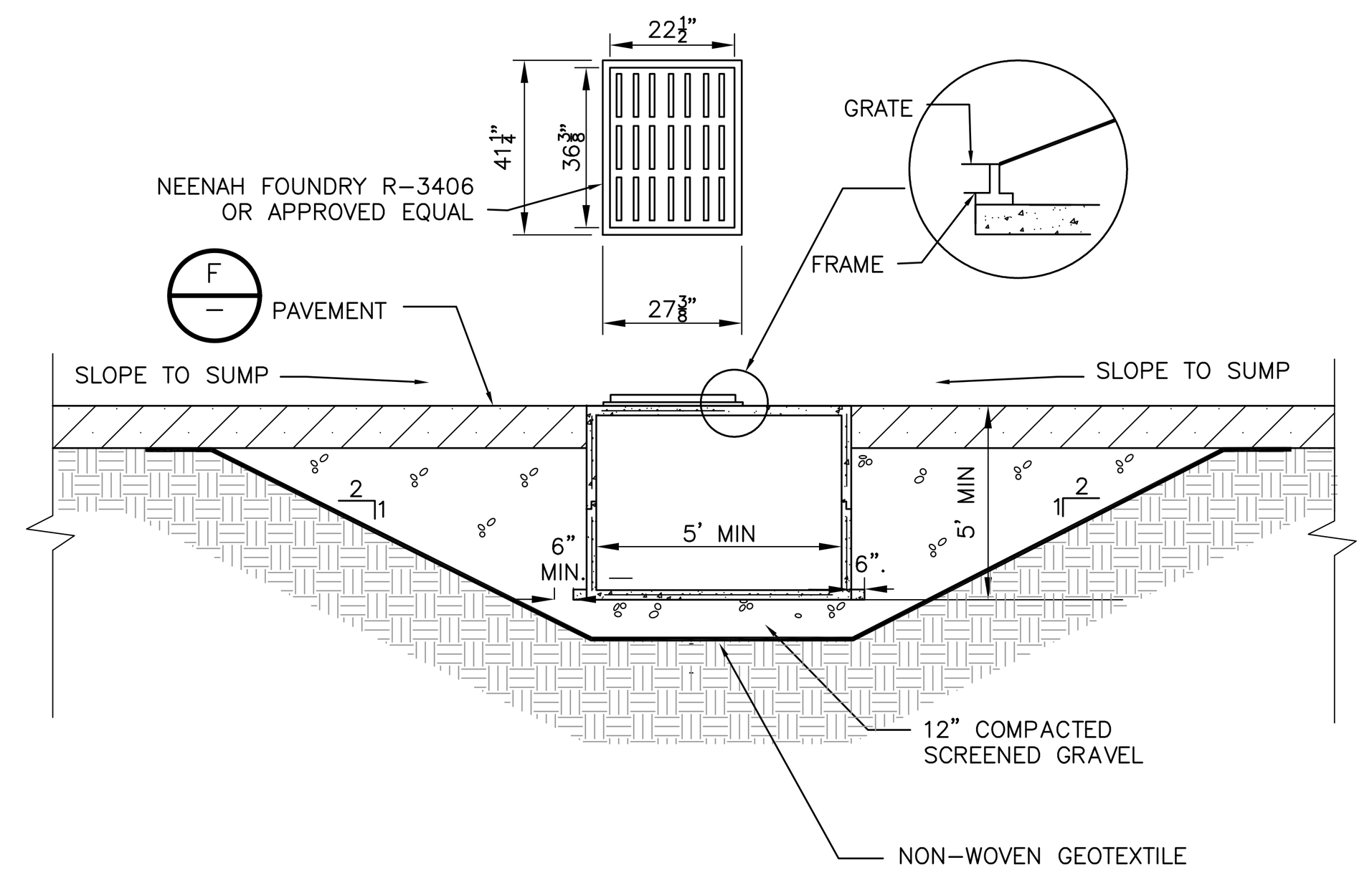
1. MINIMUM 2% SLOPE FOR DRAINAGE.



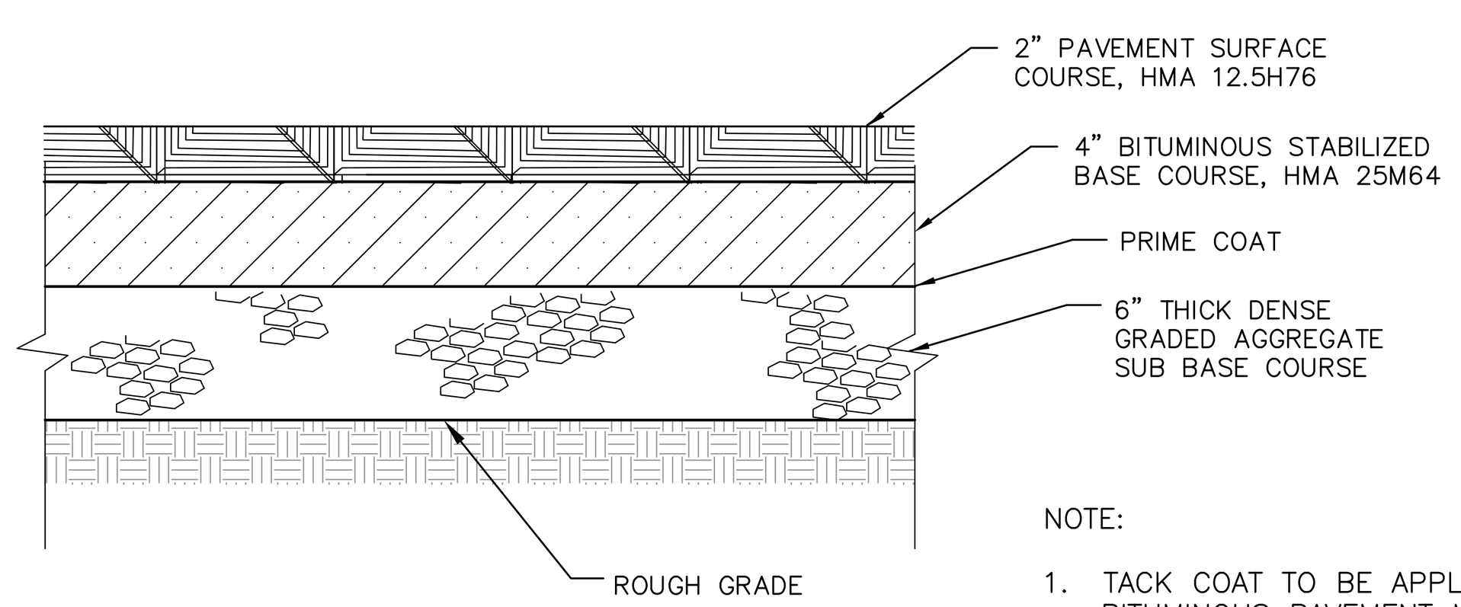
NOTES:

1. THE LINER MUST BE SECURELY FASTENED AND CONTINUOUS AROUND THE PERIMETER OF THE DEWATERING AREA WHERE THE EXTENTS ARE SHOWN ON SHEETS C-3 AND C-5.
2. THE SYSTEM SHOWN REPRESENTS A MINIMUM DESIGN EXPECTATION. A SYSTEM UTILIZING PRODUCTS OTHER THAN THE PRECAST CONCRETE HIGHWAY BARRIER SHOWN, WHICH MEET THE MINIMUM DIMENSIONAL AND WEIGHT REQUIREMENTS, MAY BE SUBMITTED FOR APPROVAL BY THE GOVERNMENT.
3. THE LINER SHALL BE IN ACCORDANCE WTIH SECTION 02776 – HDPE LINER.

SEDIMENT STOCKPILE AREA CONTAINMENT WALL
DETAIL D (C-3,5)
NTS



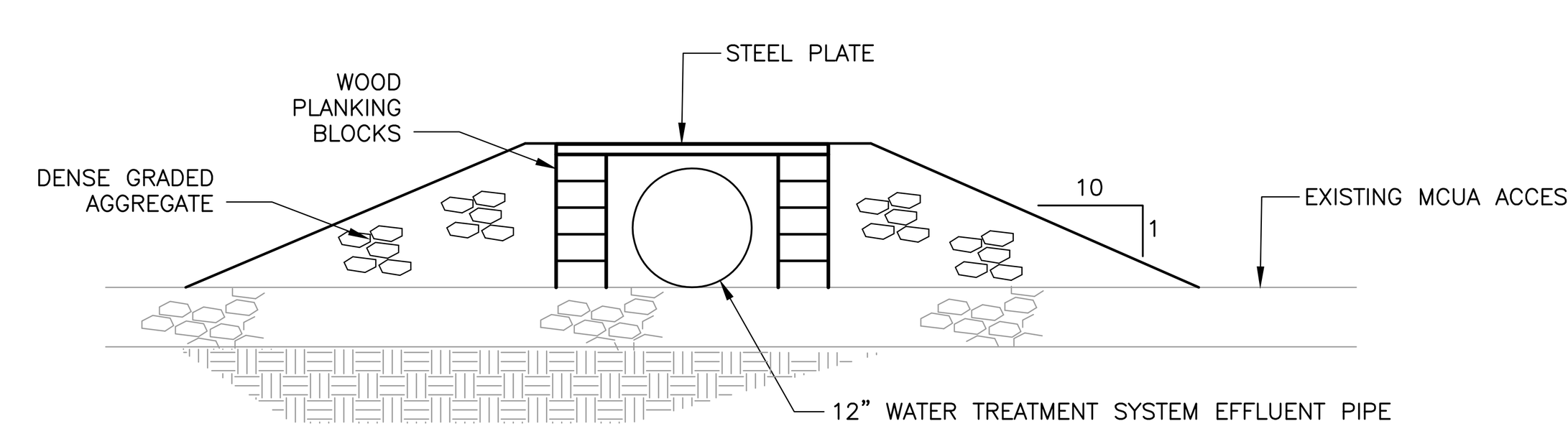
SUMP (TYPICAL)
DETAIL E (C-3,5)
NTS



NOTE:

1. TACK COAT TO BE APPLIED WHERE THE BITUMINOUS PAVEMENT MEETS THE CONCRETE OR IRON SUMP.

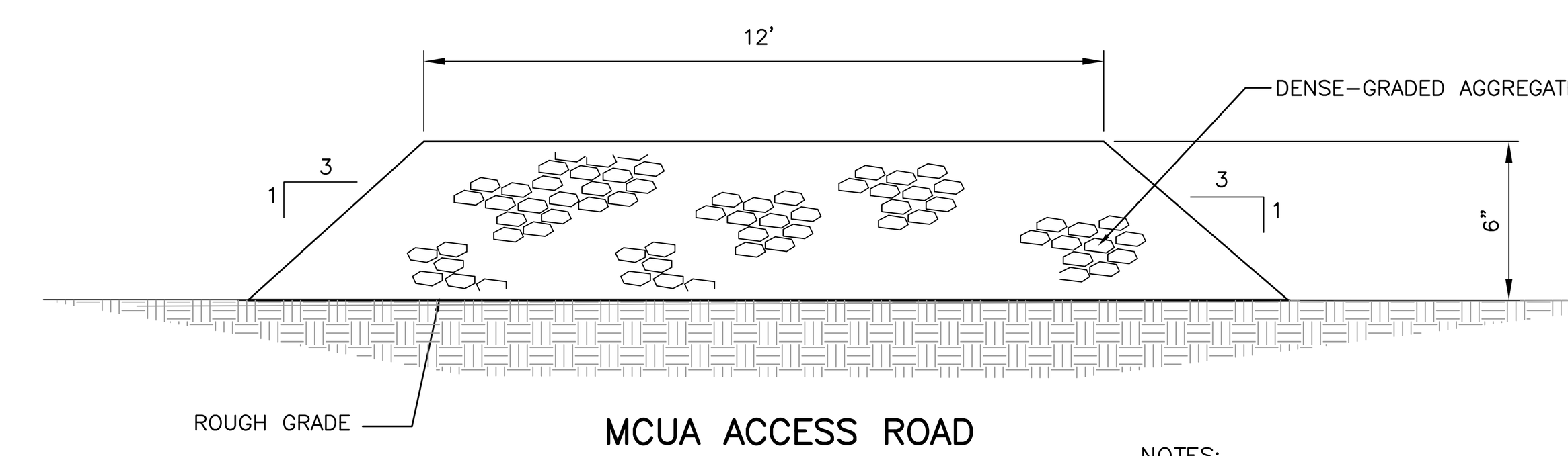
PAVEMENT
DETAIL F (C-3,5)
NTS



ABOVE GROUND PIPE PROTECTION DETAIL
DETAIL G (C-3)
NTS

NOTE:

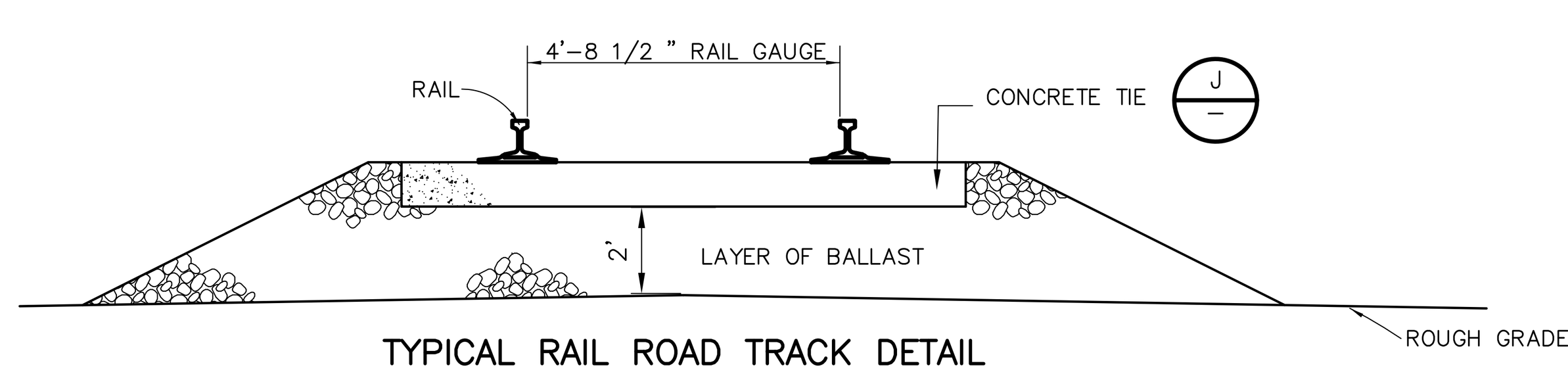
1. THE CONTRACTOR SHALL INSTALL PIPE PROTECTION IN ALL AREAS WHERE VEHICULAR TRAFFIC IS ANTICIPATED OR AS DIRECTED BY THE GOVERNMENT.
2. PIPE PROTECTION SHALL BE CONSTRUCTED IN A MANNER THAT PREVENTS DAMAGE TO VEHICULAR TRAFFIC OR BYPASS PIPES.
3. THE PIPE PROTECTION SHALL BE CONSTRUCTED ACROSS THE ENTIRE WIDTH OF THE MCUA RIGHT-OF-WAY.



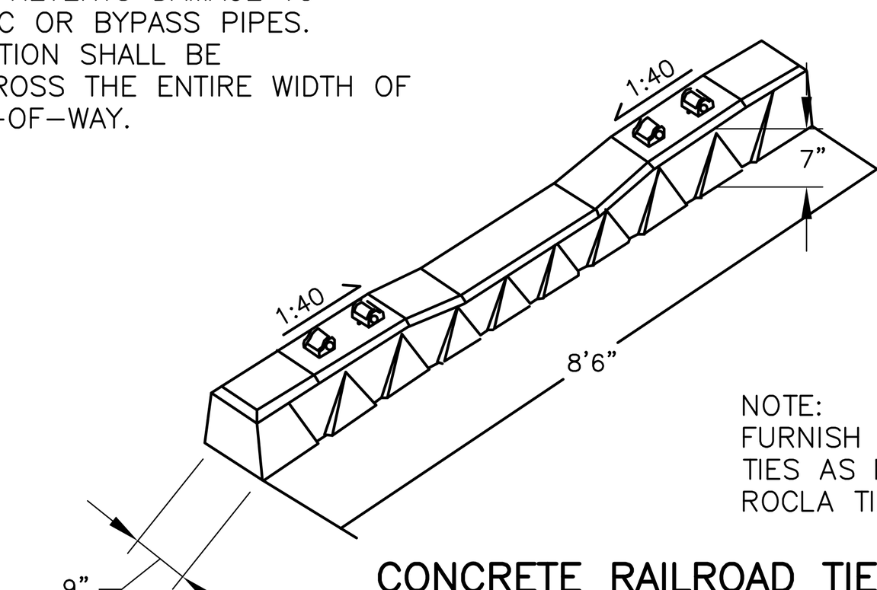
MCUA ACCESS ROAD
DETAIL H (C-3,12)
NTS

NOTES:

1. MINIMUM 2% SLOPE FOR DRAINAGE

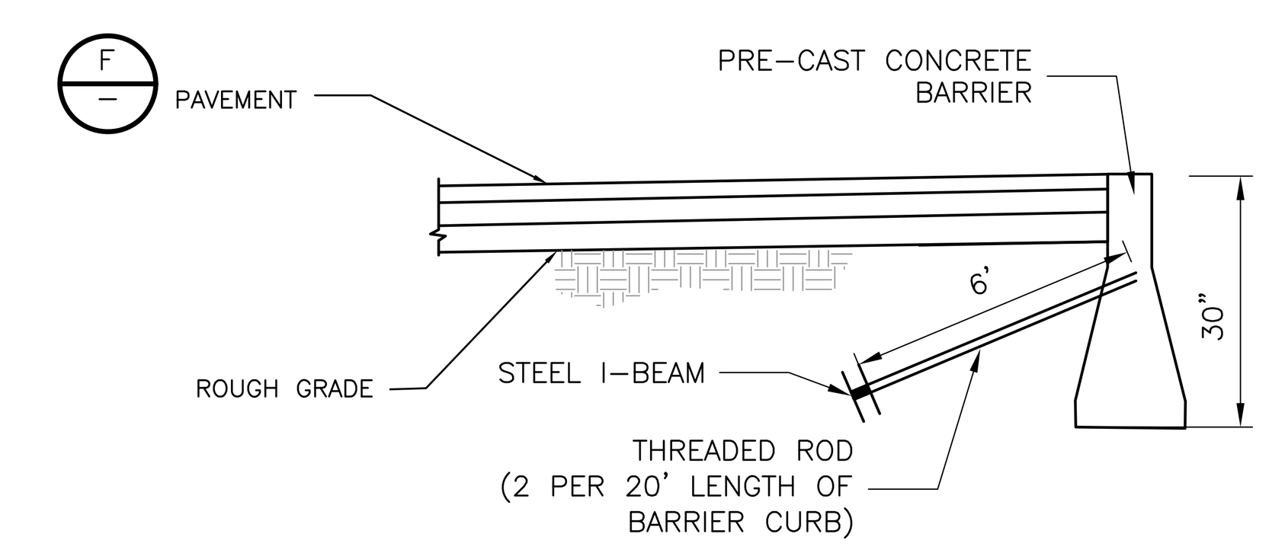


TYPICAL RAIL ROAD TRACK DETAIL
DETAIL I (C-3,5)
NTS



NOTE:
FURNISH CONCRETE RAILROAD TIES AS MANUFACTURED BY ROCLA TIE OR EQUAL MANUFACTURER.

CONCRETE RAILROAD TIE DETAIL
DETAIL J (–)
NTS



LOADOUT AREA DETAIL
DETAIL K (C-3)
NTS

US Army Corps of Engineers Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

Designed by: E. GALLERIE | Date: AUGUST 2014 | ANSIF
Dwn by: E. GALLERIE | Ckd by: T. MATHEW | Task Order: 010
Reviewed by: M. POPPER | Contract no.: W912DQ-11-D-3004
Submitted by: K. TAN | Plot date: 7/31/2014 | Plot by: Gallerie, Ellen | Scale: 1:1

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

File name: CDWDT003.dwg

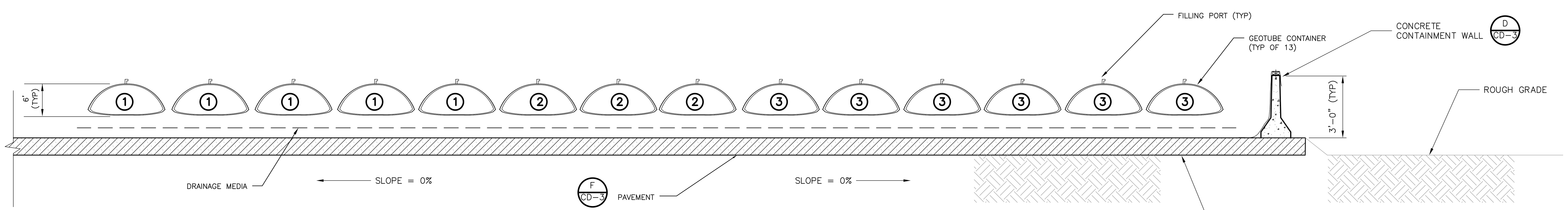
HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

CIVIL DETAILS III STOCKPILE AND DEWATERING DETAILS

SHEET NO.
CD-3

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\02 DETAILS\CDWDT003.DWG



GEOTUBE CONTAINER

SECTION 1 / C-5

NTS

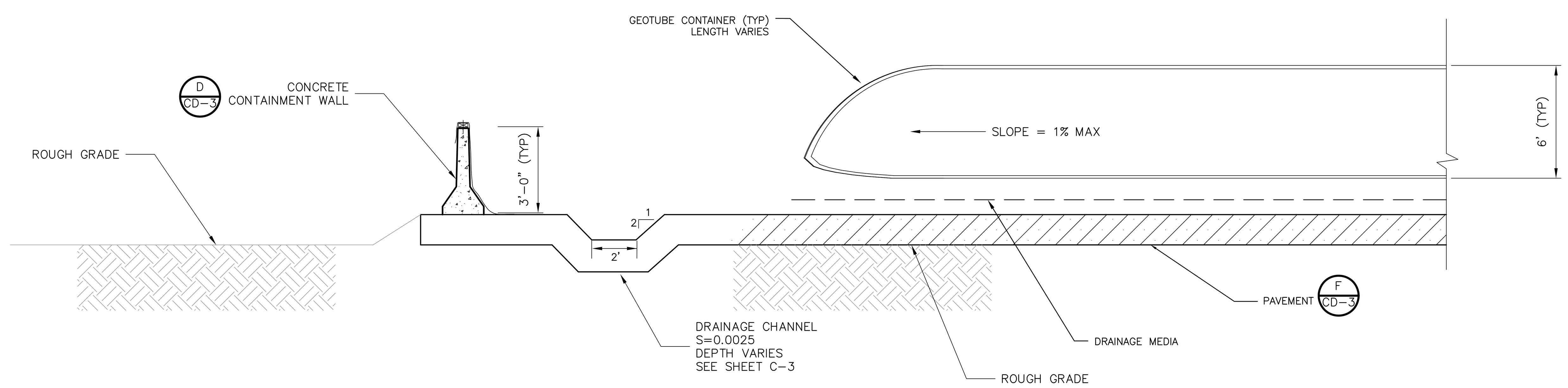
NOTES:

1. THE GEOTUBE LAYOUT SHOWN IS FOR CONCEPTUAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE FINAL SIZING AND LAYOUT OF THE GEOTUBES AS REQUIRED TO ADEQUATELY DEWATER THE DREDGED SEDIMENTS.

2. DRAINAGE MEDIA SHALL BE IN ACCORDANCE WITH SECTION 02480 – SEDIMENT DEWATERING.

ACONYMS AND ABBREVIATIONS

MAX	MAXIMUM
S	SLOPE
TYP	TYPICAL



GEOTUBE CONTAINER

SECTION 2 / C-5

NTS

US Army Corps of Engineers Kansas City District

KERSHU TAN

N.J. PROFESSIONAL ENGINEER NO. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

Designed by: E. GALLERIE
Dwn by: E. GALLERIE
Ckd by: T. MATHEW
Reviewed by: M. POPPER
Submitted by: K. TAN
Date: AUGUST 2014
ANSIF
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 7/31/2014
Plot by: Gallerie, Ellen
Scale: 1:1
File name: CGTDT004.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

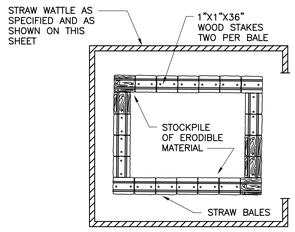
CIVIL DETAILS IV
GEOTUBES

SHEET NO.

CD-4

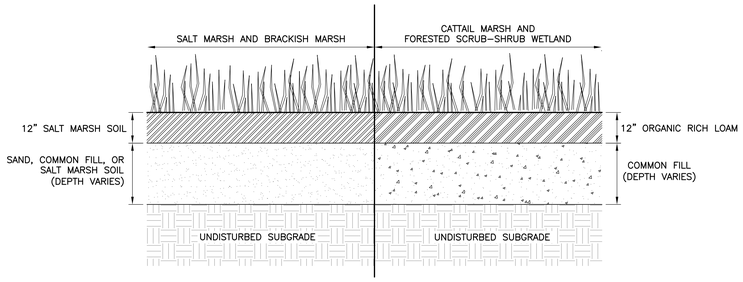
100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\02 DETAILS\CGTDT004.DWG

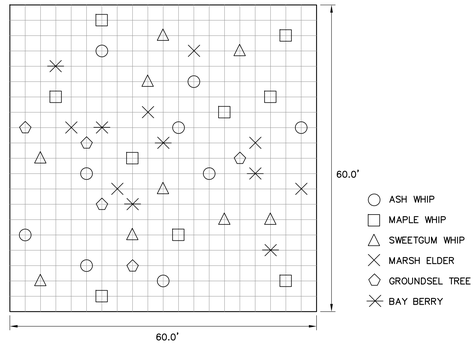


NOTES:
1. SIDE SLOPES OF STOCKPILE SHALL BE A MAXIMUM OF 2:1.
2. LIMIT OF DISTURBANCE SHALL NOT EXTEND BEYOND THE STRAW WATTLE.
3. LOCATION OF STOCKPILE TO BE DETERMINED BY THE CONTRACTOR AND APPROVED BY THE GOVERNMENT.

STAGING/STORAGE AREA
DETAIL 1 / –
SCALE: NTS



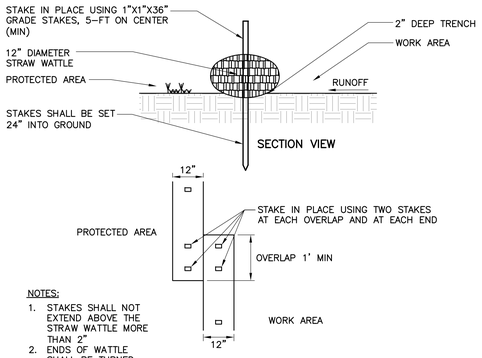
TYPICAL SOIL PROFILE
DETAIL 4 / C–9
SCALE: NTS



NOTE:
1. INTENT OF DIAGRAM IS TO ILLUSTRATE RANDOM PATTERN IN LOCATIONS OF PLANT MATERIALS
2. MINOR VARIATIONS TO POSITIONING SHALL BE AS DIRECTED BY THE GOVERNMENT

SF – SQUARE FEET

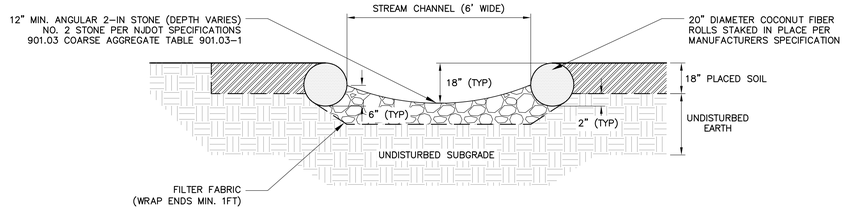
TYPICAL TREE SPACING DETAIL (3600–SF)
DETAIL 7 / C–11
SCALE: NTS



NOTES:
1. STAKES SHALL NOT EXTEND ABOVE THE STRAW WATTLE MORE THAN 2"
2. ENDS OF WATTLE SHALL BE TURNED SLIGHTLY UPSLOPE

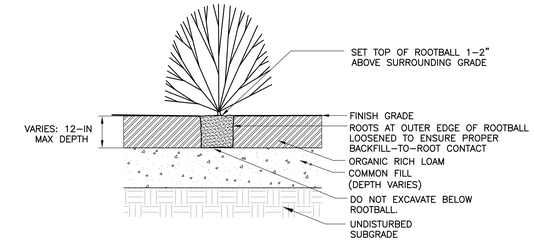
FT – FEET
MIN – MINIMUM

12–IN STRAW WATTLE
DETAIL 2 / –
SCALE: NTS

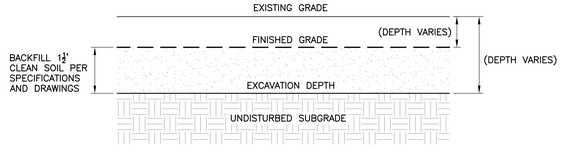


FT – FEET
IN – INCH
MIN – MINIMUM
NJDOT – NEW JERSEY DEPARTMENT OF TRANSPORTATION
TYP – TYPICAL

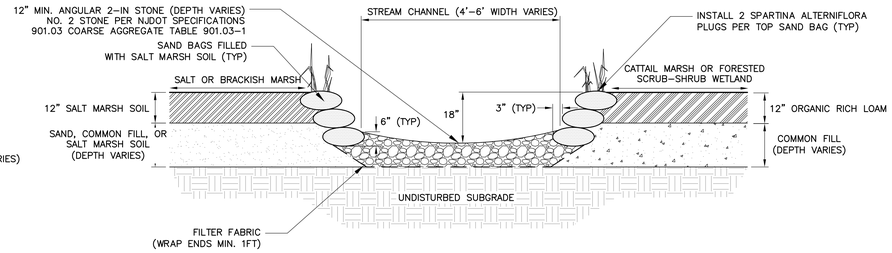
STABILIZED STREAM CHANNEL DETAIL
DETAIL 5 / C–9,11
SCALE: NTS



SHRUB/WHIP PLANTING
DETAIL 8 / C–11
SCALE: NTS

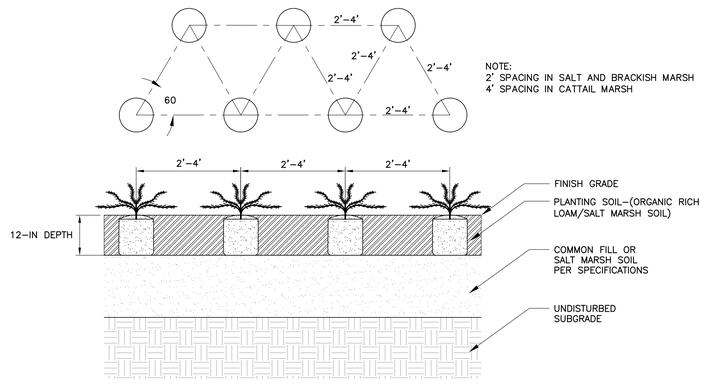


SITE EXCAVATION PROFILE
DETAIL 3 / –
SCALE: NTS



FT – FEET
IN – INCH
MIN – MINIMUM
NJDOT – NEW JERSEY DEPARTMENT OF TRANSPORTATION
TYP – TYPICAL

STREAM CHANNEL DETAIL
DETAIL 6 / C–9,11
SCALE: NTS



NOTE:
2' SPACING IN SALT AND BRACKISH MARSH
4' SPACING IN CATTAIL MARSH

SALT MARSH, BRACKISH MARSH, AND CATTAIL MARSH PLUG SPACING
DETAIL 9 / C–11
SCALE: NTS

US Army Corps of Engineers
Kansas City District

KERSHU TAN
NJ PROFESSIONAL ENGINEER
No. 24GE04439500

Mark	Description	Date	Appr

Mark	Description	Date	Appr

Mark	Description	Date	Appr

Designed by: K. TAN
Drawn by: N. WATKINS
Checked by: T. MATHEW
Approved by: M. HOWARD
Submitted by: K. TAN
Date: AUGUST 2014
Task Order: 010
Contract Number: W912DQ-11-D-3004
Plot date: 8/1/2014
Scale: 1:1 (unless otherwise noted)
ANSI F
File name: CIVILDT005.dwg

U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

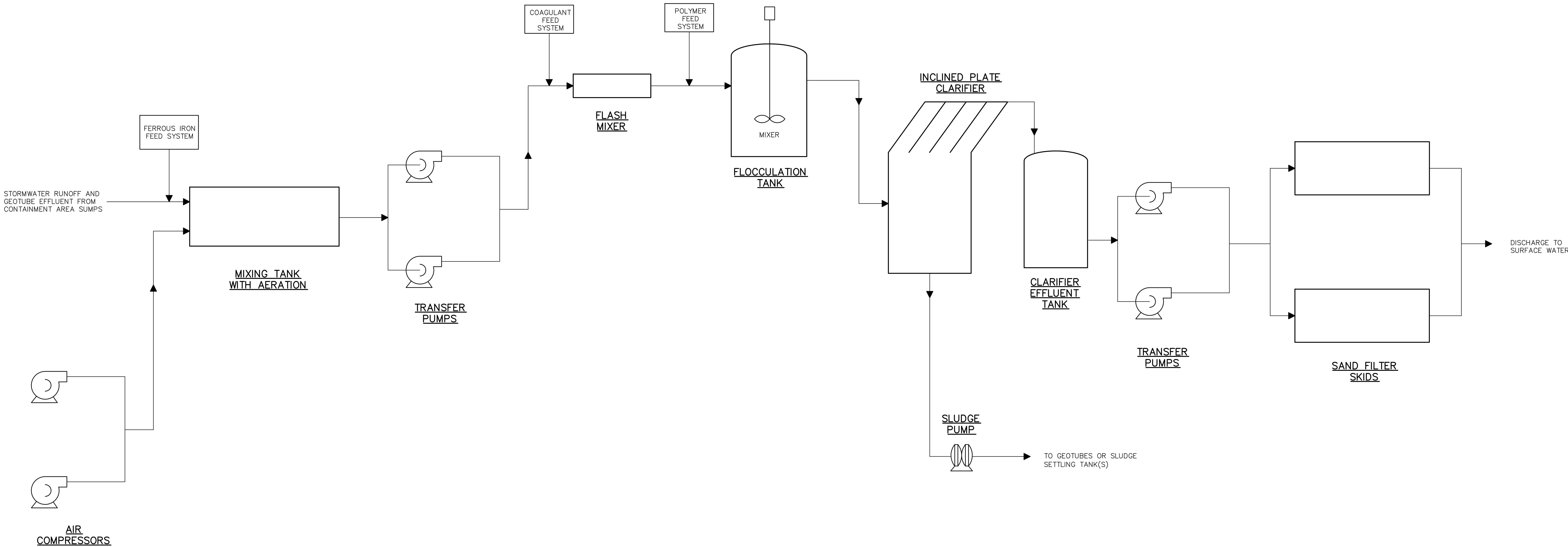
HORSESHOE ROAD/ARG SUPERFUND SITES
HAZARDOUS WASTE REMEDIAL INVESTIGATION/REMEDIATION
OPERABLE UNIT 1 (HORSESHOE ROAD)
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

CIVIL DETAILS V
WETLAND DETAILS

SHEET NO.
CD-5

PW:\\DACPWAPP1-PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\02 DETAILS\CIVILDT005.DWG

100% DESIGN



US Army Corps of Engineers
Kansas City District

KERSHU TAN
N.J. PROFESSIONAL ENGINEER
N0. 24GE04395200

Mark	Description	Date	Appr.

Mark	Description	Date	Appr.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

CDM Federal Programs Corporation

Designed by: E. GALLERIE
Dwn by: E. LARSON
Ckd by: T. MATHEW
Reviewed by: M. POPPER
Submitted by: K. TAN
Date: AUGUST 2014
Task Order: 010
Contract no.: W912DQ-11-D-3004
Plot date: 7/31/2014
Plot by: Gallerie, Ellen
Scale: 1:1
ANSIF
File name: ITPID001.dwg

HORSESHOE ROAD/ARC SUPERFUND SITES
OPERABLE UNIT 3 - MARSH AND RIVER SEDIMENT REMEDIATION
BOROUGH OF SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

WATER TREATMENT SYSTEM PROCESS FLOW DIAGRAM

SHEET NO.
P-1

100% DESIGN

PW:\\DACPWAPP1:PW_XM1\DOCUMENTS\51147\91691\04 DESIGN SERVICES NM_100%\02 CIVIL\10 CADD\ITPID001.DWG